MANGO INDUSTRY SUSTAINABILITY WORKBOOK

Laying the Foundation for a Sustainable Mango Industry

NATIONAL MANGO BOARD • FIRST EDITION • 2017

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DEAR MANGO BOARD MEMBERS,

The National Mango Board (NMB), is committed to providing you the tools and resources your mango business needs to succeed in the industry. This year the NMB has reached a significant milestone by developing the first Mango Sustainability Workbook.

The National Environmental Policy Act of 1969 defines sustainability as a way "to create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations." In the mango industry, sustainability can advance productivity and, operational efficiency. This would therefore, lower costs, and could be used as an appealing marketing lever. Additionally, fair treatment of workers would increase productivity and loyalty, adding to the success of the business.

Our sustainability journey began in 2010 with an assessment of Mexican mango production and packing operations. At that time, we also followed the mango supply chain up to the consumers in the U.S., and wrote a report to identify their status, challenges, and opportunities. In 2015, we continued the assessment of more Mexican operations as well as those from Brazil. With this information, the board decided to develop a sustainability program for in-country operations. The purpose of this program was to show members that our industry would become more resilient to both environmental and socio/economic changes by following good sustainability practices, and would also benefit producers, packers, importers and consumers.

A good example is how climate change is altering weather patterns in many Latin American growing areas. We can ensure production by implementing sound environmental measures at the production level, such as efficient water usage, increasing the ability of the soil to provide both nutrients and water to mango trees, and protecting pollinators. These measures would allow orchards to resist extended drought or other extreme weather events.

The Mango Industry Sustainability Workbook is our first attempt to unite social and environmentally responsible practices to the mango industry. Sustainability experts have collected these practices and later reviewed by an NMB subcommittee. These practices are relevant to promote a resilient industry and to relate to retail or third-party certifications requirements. This workbook will be useful in your efforts to grow and/or pack mangos, which are not only healthy and tasty, but are also responsible towards the community they are grown in.

Thank you for making a difference in your community.

Sincerely,

Leonardo Ortega
Director of Research

TOWARDS A MORE SUSTAINABLE MANGO SUPPLY CHAIN

The production of some agricultural commodities, including the mango industry, depends on natural and social resources. Contributing to a range of valued public goods, such as clean water, wildlife and habitats, carbon sequestration, flood protection, groundwater recharge, landscape amenity value and social well-being, not only ensures a bright future for mango production but also for people and the environment. As the needs of the mango industry change, the NMB is committed to supporting supply chain sustainability to ensure long-term growth.

The mission of the National Mango Board (NMB) is to increase the consumption of fresh mangos in the U.S., through innovative research and promotional activities while fostering a thriving industry. The NMB has developed two core programs to move the industry forward. These two programs are marketing and research.

The NMB marketing program targets consumers, retailers, foodservice, nutritionists with information about selection, ripening, cutting, varieties, and nutrition, along with delicious recipes. The research program helps the entire mango supply chain to deliver a quality product to the U.S. consumer; by doing research to help educate growers, shippers, packers, importers, retailers, and others. The NMB's research program also investigates the nutritional properties of mangos and conducts studies about the potential health benefits of mangos.

A sustainable agricultural supply chain seeks to make the best use of nature's goods and services while recognizing that resiliency is embedded within local sources of human capital, comprised of leadership, ingenuity, management skills and knowledge. Agricultural systems with high levels of social and human capital are more able to innovate in the face of uncertainty and reduce risks to individual businesses and the whole supply chain.

Agricultural sustainability does not require a net reduction in input use, rather, it seeks the most efficient use of existing resources (e.g. land, water, biodiversity) that does not deplete these resources for future use. It uses natural, social and human capital assets, combined with the best available technologies and inputs that minimize or eliminate harm to the environment while providing a positive impact to society.

Over several years, the NMB has sponsored assessments of mango production and packing practices in Mexico and Brazil. These assessments helped identify common practices, employed by mango growers, packers, and importers, that reduce risk to the mango industry. These business risks include:

- **Physical risk:** a risk that would make growing and selling mangos impossible;
- **Reputational risk:** a risk that would negatively impact the image of the business/industry and do it financial harm;
- **Regulatory risk:** a risk that would lead to fines being incurred from regulatory authorities; and,
- **Financial risk:** a risk that would directly affect finances (all risks ultimately affect finances, however these risks refer to direct consequences such as price of fertilizer, fuel, etc.).

This workbook provides a comprehensive overview of practices that support a sustainable mango business for both producers and packers, in the context of the risks listed above. It includes practices that observed during the assessments, practices specific to the mango industry, as well as the best sustainable agricultural practices in general. Each practice has been cross-referenced to industry certification programs or a retailer vendor questionnaire, thereby tying practices back to supply chain needs.

The key principles for sustainability considered in this workbook are:

- Integrating biological and ecological processes such as nutrient cycling, nitrogen fixation, soil regeneration, allelopathy, competition, predation, and parasitism into food production processes.
- Minimizing the use of non-renewable inputs that cause harm to the environment or the health of farmers, local communities, and consumers.
- Respect human rights, labor laws and the well-being of workers.
- Making productive use of the knowledge and skills of farmers, thus improving their self-reliance and substituting human capital for costly external inputs.
- Efficient use of people's collective capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation and ecosystem health.

When correctly employed, sustainability will make your business resilient to external change, allowing your business to supply to the U.S. market for many years to come.

The workbook comes with a self-evaluation tool designed to help you understand and improve your sustainability performance. The use of the questionnaire is voluntary; however, we encourage you to take it at least yearly and record your results so you can self-evaluate your progress over the years. Another source of information is the NMB website, which provides additional resources on individual practices.

We hope that this workbook and accompanying material is useful in guiding change towards more sustainable practices in your business. Of course, we also welcome any feedback on how it can be improved.

How to use this Sustainability Workbook

This workbook is divided into two main sections: one for mango producers and the other for packers. In the **PRODUCTION SECTION** the workbook includes 76 sustainable practices divided into the following 11 chapters:

1. Integrating Sustainability into Your Business Strategy
2. Water Use and Management
3. Energy Use and Management
4. Fertilizer Use and Management

5. Soil Management
6. Pest and Disease Management
7. Waste Management
8. Using Biodiversity to Sustain Long-Term Production
9. Worker Compensation
10. Worker Health & Safety
11. Other Worker Benefits

Similarly, the **PACKING SECTION** include 57 practices divided among the following seven chapters:

1. Integrating Sustainability into Your Business Strategy
2. Water Use and Management
3. Energy Use and GHG Emissions
4. Waste Management
5. Worker Compensation
6. Worker Health & Safety
7. Other Worker Benefits

Each chapter begins with an introduction indicating the relevance of the related practices for mango producers or packers, as well as the potential benefits to be garnered from making progress in this area. From there, each sustainable practice includes a description, a list of the related benefits for producers or packers, and the cost level of practice implementation and maintenance. Where relevant, they also include tips on implementation, additional information provided in text boxes, and links to organizations, documents, databases and reports where relevant information and guidance can be found.

This workbook is not a "how-to" manual or a set of rules for producers and packers, but rather a guide to help implement changes that would improve practices at farms and packinghouses. The information provided for each practice is a starting point, and we recommend each operation conduct the related research to determine the resources, legal guidelines, and programs available in their region.

We recommend that mango producers and packers first review all the practices in their section, and determine priority areas. The self-evaluation tool that accompanies this workbook is the easiest way to detect important areas for improvement at your farm or packinghouse. A simple action plan can be developed based on the results of your self-evaluation. We recommend first making changes to ensure legal compliance in all areas, and whether implementing practices will require little or no monetary investment. If investment is required, we recommend that actions be prioritized based on the potential for maximizing efficiencies and production, while minimizing any potential negative environmental or social impacts of your operations, as well as on budget considerations.

Once these priorities have been identified, users can focus on the areas or specific practices where they wish to start making progress towards more sustainable operations.

Acknowledgements

This Sustainability workbook wouldn't be possible without the expertise and feedback of the industry members who participated in the Advisory Group for the Mango Sustainability Program. We extend our thanks, therefore, to Joaquín Balarezo, Patrick Dueire, Veny Martí, Tomás Paulín, Enrique Sánchez, and Jacquie de Swett, who helped ensure the relevance and usefulness of this workbook for mango packers and producers.

The oversight and input from members of the National Mango Board team, Leonardo Ortega, Wanda Ramos, and Carla Sosa, was also key to the development of this workbook and the related evaluation and training materials.

We also extend our thanks to several experts who provided their insights into specific practices. In this regard, we would like to thank Dr. Sergio Nieto, Dr. Emilio Hernández, and Dr. Adolfo Gabriel Levin, for sharing their knowledge on specific mango production and packing practices.

Finally, we would like to thank the producers and packers who participated in past sustainability assessments in Mexico and Brazil, and who shared some of their best practices, which have now been integrated into this workbook.

PRODUCTION

PRODUCTION SECTION

1. INTEGRATING SUSTAINABILITY INTO BUSINESS STRATEGY

INTEGRATING SUSTAINABILITY INTO BUSINESS STRATEGY

Sustainability is defined as the successful management of critical business risks for a business to continue to be profitable today and for the foreseeable future. It sees business opportunity in efficiency, adaptability and planning for current and future resource availability changes, as well as in improving the lives of its employees and nearby communities. Sustainability is imperative to economic success in today's world and will become more so in the decades to come, as global supplies of non-renewable resources dwindle and demand grows.

Running a sustainable mango farm and achieving high levels of growth and profitability are not necessarily conflicting. But to meet both goals, agribusinesses "will have to take a long-term strategic view of sustainability and build it into the key value creation levers that drive returns on capital, growth, and risk management". This mean not only integrating sustainability goals and strategy into the company mission, vision and value statement, but also setting yearly sustainability objectives and sharing them with appropriate stakeholders.

Integrating sustainability into your business strategy can have the following advantages:

- **Meeting procurement expectations:** An increasing number of important customers are asking producers sustainability-related questions. A mango producer that has integrated sustainability into their business strategy is in a stronger position to answer these questions and meet expectation for sustainable operations.
- **Improving brand value and reputation:** Making sustainability part of your business and sharing your story with mango consumers are powerful marketing tools. Brand reputation is one of the most valuable assets of a business/industry.
- **Meeting consumer demand:** Sustainability issues are becoming mainstream due to their increasing importance for consumers. As the income and market share of Generation Y and Millennials increase, so will the demand for sustainable products.
- **Increasing efficiencies:** Socially and environmentally responsible practices often go hand-in-hand with cost reductions, as is the case for water and energy efficiencies.

This chapter includes five (5) practices that producers can implement to integrate sustainability into their business strategy:

- 1.1. The farm has formally integrated sustainability in its business strategy.
- 1.2. The integration of sustainability into the business strategy has been shared with appropriate employees and/or key external stakeholders
- 1.3. The company has designated one person to guide the orchard sustainability strategy.
- 1.4. Yearly sustainability objectives are set for water and energy use and waste reduction.
- 1.5. The operation has a system in place to ensure legal compliance with national environmental and labor standards.

1.1.

YOUR FARM HAS FORMALLY INTEGRATED SUSTAINABILITY INTO ITS BUSINESS STRATEGY.

DESCRIPTION

Sustainability goals and strategies are integrated into your farm's mission, vision, value statement, and are part of the business core strategy that guides daily operations.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Integrating sustainability into a company's core business model enables the business to create more value, manage risk and address today's global environmental, social and financial challenges.

Tips for implementation

Implementing the following 3 steps can help you integrate sustainability into your business strategy:

- Strategic integration: Integrate sustainability into your business purpose, priorities and goals to distinctively position your operation. One way of doing this is to integrate sustainability into your farm mission and vision. For example, your farm vision could read: "To ensure resource conservation through innovative agricultural practices that maximize efficiencies in all areas of our business".
- Operational integration: Implement the necessary processes, policies and practices to improve the execution of your strategy (see Practices 1.4 and 1.5.). For example, your farm could establish water use targets, and implement day-to-day practices to ensure they are met.
- Cultural integration: Leverage your business identity and culture to better engage your internal and external stakeholders in developing sustainability practices (see Practices 1.2. and 1.3.). Have open and honest conversations with your stakeholders (including agrochemical companies, packers) about your expectations around the sustainability of their operation and of the mango production supply chain as a whole.

WHERE TO GET MORE INFORMATION

English:
https://www.unglobalcompact.org/take-action/leadership/integrate-sustainability/roadmap

1.2.

THE INTEGRATION OF SUSTAINABILITY INTO THE BUSINESS STRATEGY HAS BEEN SHARED WITH STAKEHOLDERS.

DESCRIPTION

Your employees and key external stakeholders (e.g. packers, neighbors, etc.) are informed about the integration of sustainability into your business strategy.

Implementation Cost

Low cost.
Costs related to the creation of communication materials.

Maintenence Cost

No cost.

Benefits

Your employees and external stakeholders play a crucial role in making your company's sustainability strategy a reality. Regularly communicating and sharing the impact of your efforts demonstrates your commitment to sustainability, and fosters the active participation of your staff and external stakeholders in programs and initiatives. Giving your employees and stakeholders ownership of the strategy will allow you to obtain long-lasting results faster.

Tips for implementation

- Ensure the commitment of senior management to the organization's sustainability goals.
- Classify employees and external stakeholders into specific groups in terms of their interest in sustainability, and craft messaging for each group.
- Use multiple communications tools (posters, team meetings, email, internal/external reports, training, etc.).
- Include sustainability as an integral part of employees' job descriptions.
- Respond to feedback, and let employees and external stakeholders know that changes are being made based on their input.

1.3.

A PERSON OR A TEAM HAS BEEN DESIGNATED TO GUIDE YOUR FARM'S SUSTAINABILITY STRATEGY.

DESCRIPTION

Your farm's sustainability efforts are being championed and monitored by a person or a group of people, who are empowered to make decisions regarding sustainability practices.

Implementation Cost

Variable cost. Costs depend on wages and will vary depending on whether a new position needs to be created or if additional responsibilities are assigned to an existing position.

Maintenence Cost

Variable cost. Costs depend on wages and will vary depending on whether a new position needs to be created or if additional responsibilities are assigned to an existing position.

Benefits

Having employees within your organization who are responsible for the sustainability strategy, not only formalizes your commitment to sustainability, but also ensures that your business objectives are aligned with your corporate social and environmental actions.

Tips for implementation

It is recommended that the person(s) in this position be creative and innovative, in addition to having the education and technical knowledge required to develop and implement sustainability strategies.

1.4.

YEARLY SUSTAINABILITY TARGETS ARE SET.

DESCRIPTION

Annual performance targets are established for the following areas:

- Energy use and management.
- Water use and management.
- Waste reduction and waste management.

Implementation Cost

Low cost.
Costs related to the time dedicated to established the targets and to collect the necessary data.

Maintenence Cost

No cost.

Benefits

Setting specific, tangible targets can help your farm measure the effectiveness of your sustainability strategies. Implementing relevant practices, policies and procedures to achieve targets and sharing these targets with your employees helps them understand important short- and long-term operational priorities and allows them to carry out activities that provide tangible business and sustainability value.

Tips for implementation

- Understand your starting point, that is, how much energy, water, or waste is currently being used or generated. This will help you set achievable and relevant targets.
- Implement relevant policies and procedures to achieve targets.
- While targets need to be achievable and based on real production needs (variety of mangos, condition of irrigation systems, etc.), they also need to drive innovation and change, in addition to focusing on increasing long-term resource efficiency.
- Create appropriate data structures to capture and report on the status of your targets.

WHERE TO GET MORE INFORMATION

English:
https://www.unglobalcompact.org/take-action/leadership/integrate-sustainability/set-goals

SETTING SMART TARGETS

Specific: It is easier to accomplish a specific target than a general one.
Measurable: Ensure your target has a specific measurable component (if you can't measure it, you can't manage it).
Achievable: The target needs to challenge people but be achievable at the same time.
Relevant: Ensure that your target is relevant and meaningful to your farm's needs.
Timely: Set a deadline for your target (one year, one month, 5 years).

1.5.

A SYSTEM IS IN PLACE TO ENSURE LEGAL COMPLIANCE WITH NATIONAL ENVIRONMENTAL AND LABOR STANDARDS.

DESCRIPTION

There is a person (or a team) in charge of ensuring that your farm meets all applicable local, state, national and international laws, codes and regulations, including those related to the environment and labor. This person (or team) will develop a system (code of conduct, training, policies) to ensure daily operations are meeting these standards.

Implementation Cost

Variable cost.
Costs depend on in-house knowledge, and might include hiring a specialist (consultant).

Maintenence Cost

Medium cost.
Costs are related to the time needed to monitor changes of standards.

Benefits

Compliance with legal requirements ensures that generally accepted minimum performance standards are met and reduces liability for vendors and buyers. In addition, operations that do not demonstrate legal compliance can be subject to penalties that could potentially result in substantial monetary fines and reputational damage.

Tips for implementation

- Create a compliance committee that is responsible for aligning your company policies, procedures and programs with national and international laws, codes, and regulations.
- Develop a code of conduct which sets expectations that your employees will comply with all laws and regulations governing the operation.
- Train your employees on the company code of conduct, as well as any new standards and policies.
- Document any violations within the past three years and their resolution.
- Provide the tools and resources to ensure full collaboration of different entities (administration, HR, agrochemical handlers, field workers, transportation, etc.).
- Create a Compliance Calendar to identify and implement the steps necessary to comply with each requirement.

A SYSTEM IS IN PLACE TO ENSURE LEGAL COMPLIANCE WITH NATIONAL ENVIRONMENTAL AND LABOR STANDARDS.

COMPLIANCE TRACKING TOOL

Track all applicable local, state, national and international laws, codes and regulations, including those related to the environment and labor. A supervisor can be made responsible for recording this information. An office worker can easily enter this information into the business calendar to ensure timeline will be respected.

Theme	Regulation entity	Norm	Title	Permit	Documentation needed	Timeline	Person in charge	Action items
Water Use	Department of Ecology's Water Resources Program	Water Resources Act of 1971	Curtailing Water Use	Water right permit	Form 12.1 Meter reading	02-10-2017	Y. Lopez	• Create training material • Meet with maintenance

WHERE TO GET MORE INFORMATION

Consult local, regional and national authorities to identify the environmental and labor standards your farm should comply with.

English:
https://www.misa.umn.edu/publications/businessandsuccessionplanning/buildingasustainablebusiness

2. WATER USE AND MANAGEMENT

WATER USE AND MANAGEMENT

Access to clean, fresh water is vital to mango production. Optimal application of water will maximize the production of tasty, juicy fruits that will sell well on the local and international markets. However, mango orchards are often located in water scarce regions, where growing urban and industrial centers compete for water resources, and where climate change will most likely exacerbate imbalances between water availability and demand. In other words, future access to quality water is uncertain and represents a risk to operations.

Sustainable water management is critical for mango producers to continue their operations, while sharing water resources with other users. This means ensuring that every drop of water is being used as efficiently as possible either through technology (e.g. micro irrigation) or management practices (e.g. regulated deficit irrigation, leak control, usage tracking, etc.), and that runoff water does not represent a source of contamination for nearby ecosystems or communities. These actions will not only reduce financial risk for your operations but will also reduce the reputational risk for the entire mango industry, whose consumers are sensitive to food production systems that are known to endanger water resources.

In this context, this chapter includes eight (8) practices your farm can implement to eliminate water loss and maximize use efficiency to conserve water and mitigate these risks.

- 2.1. When irrigation technology is needed, micro-irrigation is used as the main irrigation method.
- 2.2. When a water irrigation system is used, irrigation scheduling for Regulated Deficit Irrigation (RDI) and water stress are used.
- 2.3. Meteorological data, evapotranspiration rates, soil type and plant needs are used for irrigation planning.
- 2.4. Water usage is known and tracked.
- 2.5. The quality of irrigation water is assessed.
- 2.6. Improvements are implemented that increase water infiltration and reduce evaporation.
- 2.7. The potential for fertilizer and agrochemical contamination of surface and ground water is assessed and mitigated when/if needed.
- 2.8. Rainwater is harvested onsite and used for irrigation.

2.1.

WHEN IRRIGATION TECHNOLOGY IS NEEDED, MICRO-IRRIGATION IS USED AS THE MAIN IRRIGATION METHOD.

DESCRIPTION

If your farm cannot rely solely on rain for irrigation purposes, micro-irrigation (including drip irrigation, under tree sprinkler systems, drip sub-irrigation or spray irrigation) is chosen as the main irrigation system.

Implementation Cost

High cost. Micro-irrigation is known to be the most capital intensive type of irrigation system. Installation costs for subsurface drip irrigation range from $5,000 USD to $7,000 USD per hectare.

Maintenence Cost

Medium cost. Costs related to routine checks and reparations for leaks and accuracy of water meters.

Benefits

Irrigation for agriculture is the leading use of freshwater worldwide. Conserving water is essential for sustaining food production, minimizing costs and respecting the needs of other water users. Micro-irrigation is a generic term for a family of irrigation systems that allows water to filter slowly from the surface to the roots of the mango tree by means of surface or sub-surface applicators or emitters. Micro-irrigation techniques use significantly less water per unit of output than other irrigation techniques, in addition to reducing losses due to runoff and leaching and promoting plant health. Systems based on drip or micro-spray irrigation, used in combination with meteorological data, and information on plant requirements and onsite evapotranspiration rates (see Practice 2.4), allow you to provide the exact amount of water needed by the trees.

Other benefits of micro-irrigation systems include:

- **Prevention** of water loss and soil erosion.
- **Enhancement** of plant growth and yield.
- **Energy** and labor savings.
- **Improvement** of fertilizer application efficiency (fertigation – see Practice 4.4).

TYPES OF MICRO IRRIGATION SYSTEMS

- Drip irrigation. This system involves dripping water onto the soil at very low rates (2-20 liters/hour) from a network of valves, pipes, tubing, and emitters or drippers. Water is applied close to plants or directly onto the root zone.
- Micro-spray. This system is a cross between surface spray irrigation and drip irrigation. It delivers water through micro-tubing connected to a series of nozzles that are attached to risers (either fixed or designed to pop-up). Micro-spray is generally considered a low volume irrigation system (18.9/264 liters/hour). Micro-spray typically creates a larger wetted area (2-meter radius) than drip irrigation and is suitable for irrigating ground covers and sandy soil.

WHEN IRRIGATION TECHNOLOGY IS NEEDED, MICRO-IRRIGATION IS USED AS THE MAIN IRRIGATION METHOD.

Tips for implementation

Micro irrigation has been very successful when installed in newly developed and already established orchards. However, certain precautions should be taken when converting an established orchard to drip irrigation mainly in relation to the water quantities applied and drip line placement.

Drip irrigation systems are preferably installed immediately following harvest, as water supply may needs to be shut down during conversion, and trees are less likely be become stressed in cooler weather and without a crop load. Increasing drip irrigation applications is recommended during the year following the conversion, as superimposing a water deficit on top of the conversion is likely to lead to significant stress.

Proper design and water management is essential for the micro-irrigation system to deliver the required quantity of water to satisfy tree's water demand and avoid water deficit. Amongst the factors that require attention are: water source, water quality, water availability, soil type, cultivar, plantation frame and climatic conditions. Proper maintenance (to be checked routinely for leaks, acid application, chlorine, etc.) is another essential factor for the success of the implementation of the irrigation system in the medium and long range.

WHERE TO GET MORE INFORMATION

Contact your local agriculture agency for additional expertise and knowledge.

English:
http://www.sswm.info/category/implementation-tools/water-use/hardware/optimisation-water-use-agriculture/drip-irrigation
http://homeorchard.ucanr.edu/The_Big_Picture/Irrigation/

Spanish:
https://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/37462/em8782-S.pdf

2.2.

WHEN A WATER IRRIGATION SYSTEM IS USED, IRRIGATION SCHEDULING FOR REGULATED DEFICIT IRRIGATION (RDI) AND WATER STRESS ARE USED.

DESCRIPTION

Regulated Deficit Irrigation (RDI) involves varying the degree of deficit irrigation (DI) according to critical phenology.
In semiarid conditions AND when your orchard has a water irrigation system that allows irrigation scheduling, RDI may be used as a water conservation technique. With RDI, trees are kept short of water during fruit set and first fruit growing period (rapid growth by cell division). Even though water deficit during these periods may affect fruit numbers, a fruit growth compensation can be achieved when full irrigation is reestablished. Although a relative small yield may be lost, from an economic point of view, the return on investment may be even better due to better fruit size distribution.

Implementation Cost

Variable cost.
Costs related to the tools needed for evapotranspiration data and soil monitoring and will vary depending on whether this information is readily available to the farm or need to be bought.

Maintenence Cost

No cost.

Benefits

RDI is a management technique that allows you to reduce your water consumption, and therefore costs, while improving fruit quality.

Tips for implementation

Predetermine the appropriate level of RDI and plant water stress using evapotranspiration data. Implement any modifications based on monitoring of soil humidity.
Until a tree has reached its desired size, do not expose it to water stress. However, once the tree has grown to its desired size, significant growth not only increases the need for pruning but can also contribute to yield reductions.

WHERE TO GET MORE INFORMATION

Contact your local agriculture agency for more information.

English:
http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-34292013000300002

Spanish:
http://bit.ly/2peydAS

2.3.

METEOROLOGICAL DATA, EVAPOTRANSPIRATION RATES, SOIL TYPE AND PLANT NEEDS ARE USED FOR IRRIGATION PLANNING.

DESCRIPTION

To ensure that water use is not excessive or wasteful, your farm bases its irrigation planning on the following:

- **Meteorological data:** These may include measurements of rainfall, sunshine, air temperature, humidity, and wind speed and direction.
- **Evapotranspiration data:** Evaporation from soil surface and transpiration from canopy are key land surface processes that control photosynthesis. These data help in scheduling irrigation at critical stages of crop development. The evapotranspiration rate is normally expressed in millimeters (mm) per unit time.
- **Soil properties and characteristics:** Knowledge of soil type and texture will help to estimate water holding capacity (inches of water available to plants), and therefore will inform decisions on the quantity and frequency of irrigation.
- **Plant needs:** Moisture demand during the season is variable in relation to the stage of crop growth (i.e., flowering, fruit development, vegetative growth, root development, and dormancy). This moisture demand is highest when new shoots are developing, at flowering and at fruit set.

Implementation Cost

Variable cost. Costs related to the access to meteorological data and evapotranspiration rates and will vary depending on whether the farm has access to this information. You can also rely on nearby meteorological stations when available.

Maintenence Cost

No cost.

Benefits

Experts suggest that improving water use efficiency is the single most significant opportunity for agriculture to optimize its water demand.

Smart water management is not just about how water is delivered but also when, how often, and how much. Providing the right amount of water plays a vital role in ensuring the sustainability of your orchard. Firstly, it enhances water efficiency, and secondly, it prevents fruit drop and increases the development of young fruit.

METEOROLOGICAL DATA, EVAPOTRANSPIRATION RATES, SOIL TYPE AND PLANT NEEDS ARE USED FOR IRRIGATION PLANNING.

SIGN OF EXCESSIVE APPLICATION OF WATER

The following signs are evidence of excessive application of water due to inadequate irrigation system design, management, or flow and volume calculations: large puddles or areas of ponded water after irrigation, or excessive irrigation water run-off due to reduced water infiltration in over-saturated soils.

Tips for implementation

It is important to record meteorological and evapotranspiration data in a standardized format and provide access to these data to your irrigation managers (either through some form of data library or computerized documentation). Technical staff also require quantitative knowledge of the water requirements of the trees, as well as the interactions between soil type, water, weather and plant characteristics, for proper irrigation scheduling and management.

WHERE TO GET MORE INFORMATION

Contact your local agriculture agency for more information.

2.4.

WATER USAGE IS KNOWN AND TRACKED.

DESCRIPTION

Your farm keeps records of irrigation water use data, that include the date, actual or estimated flow rate, and volume (per water meter or per irrigation unit). Data is available for prior years, and presented in an easy-to-use format. Water usage data is consulted and used to implement effective water conservation techniques.

Implementation Cost

Variable cost. Costs related to the installation of separate water flow meters for different irrigation zones and will vary depending on whether a flow meters are already installed or not.

Maintenence Cost

No cost.

Benefits

Although this practice alone does not directly conserve water, accurate water records are essential to evaluate and improve your water management decisions and to document compliance with best practices and any regulatory requirements.

Ideally, water records show that the volume of water consumed remains stable or tends to decrease over time compared to production rates.

Tips for implementation

For this practice to be easily implemented, it is essential to ensure the following:

- Create an easy-to-use tool crafted to the needs of the irrigation process.
- Identify the person (people) in charge and the frequency of the recording.
- Train personnel in the use and interpretation of recorded water data.

Note that the installation of multiple water meters that measure water use across different irrigation zones allows for greater precision when monitoring usage and identifying water efficiency actions; however, you can develop calculations based on the flow rate per irrigation unit.

WATER USAGE IS KNOWN AND TRACKED.

WATER TRACKING TOOL

Track water use for each meter that your orchard may have. This information is often on your monthly bills or on the meters. By analyzing usage, you can see dips or spikes, which you can then attribute to specific machinery, season or usage behavior by workers. An office worker can easily convert this information into a graph to easily analyze the data behavior.

Meter#	Area	Reading 1 (m^3)	Reading 2 (m^3)	M^3	Rain	Note	Person in charge	Action items
1	Zone A	20220	20262	42	Yes (25 mm)	No	E. Espinoza	None
2	Zone B	32010	42008	9998	No	Check this meter, might have a leak	E. Espinoza	• Inform Raul about the potential leak.

2.5.

THE QUALITY OF IRRIGATION WATER IS ASSESSED.

DESCRIPTION

Physicochemical, bacteriological and/or microbiological analyses of irrigation water are carried out on a yearly basis. Appropriate actions are taken if test results exceed threshold levels for key parameters.

Implementation Cost

Medium cost.
Costs related to water testing.

Maintenence Cost

Variable cost.
Costs related in mitigating potential water quality problems and will vary depending on nature of problems.

ISSUES RELATED TO WATER QUALITY

- Water high in calcium or with a high pH can reduce the effectiveness of pesticides and may need buffering or conditioning when mixing.
- Presence of nitrogen in water may force producers to adjust their fertilizer program accordingly.
- Irrigating with water of higher salinity than the mango tree can tolerate results in yield loss and decreased quality.

Benefits

Proper water testing is not only intended to ensure food safety but to help growers determine and understand the variability of their water quality.

Water quality problems will ultimately result in soil problems and may affect production and food quality. Therefore, they require that proper action be taken.

The use of unsuitable water for irrigation can reduce your yield and hence your farm's bottom line. Also, unfit irrigation water can pose a threat to the mango industry's reputation as a whole. Appropriate water testing is a proactive practice focused on avoiding these risks.

Tips for implementation

- The laboratory report will often include some interpretive information to assist producers.
- Growers who use micro irrigation are not exempt from this practice. If irrigation water is used in the pesticide sprayers, the water could come into direct contact with the crop.

WHERE TO GET MORE INFORMATION

Consult local agriculture authority for more information about water quality parameters.

English:
http://www.fao.org/docrep/003/T0234E/T0234E01.htm

Spanish:
http://www.ipni.net/publication/ia-lahp.nsf/0/B3BD6ED103283DDD85257A2F005EF91B/$FILE/6%20Art.pdf

2.6.

IMPROVEMENTS ARE IMPLEMENTED THAT INCREASE WATER INFILTRATION AND REDUCE EVAPORATION.

DESCRIPTION

Your farm implements practices that improve water infiltration (i.e. water penetrating deep enough to reach the active root zone) and reduce evaporation, including:

- Applying mulch: Mulch is any vegetative organic material (e.g., dead leaves, straw, wood or bark chips) left permanently or temporarily on the soil surface, and which helps keep in moisture and shade out weeds.
- Maintaining cover crops, such as grasses, legumes, forbs or other herbaceous plants, on cropland.
- Irrigating at cooler temperatures, at night or before 10 a.m.

Implementation Cost

Variable cost. Costs related to the acquisition of appropriate machinery (see Practice 7.5).

Maintenence Cost

Low cost. Costs related to the maintenance of cover crops (irrigation, lawn mowing, etc.).

Benefits

Good infiltration and reduced evaporation increase water use efficiency and tree health. Specifically:

- Organic mulch will primarily conserve soil moisture, but will also break down over time releasing nutrients, adding to soil fertility and improving soil structure. Other benefits of organic mulch include: (i) reducing erosion by protecting soil from rainfall impact; (ii) controlling weed growth; (iii) calibrating soil temperature; and (iv) limiting surface run-off (see Practice 7.5).
- Cover crops improve soil structure and water infiltration and reduce compaction (see Practice 5.1).
- Irrigating at cooler temperatures can provide water savings of up to 20–30% compared with daytime irrigation, by reducing evaporation loss. Irrigating during off-peak periods also helps maintain water pressure, even out the demand water distribution systems and reduce electricity costs.

IMPROVEMENTS ARE IMPLEMENTED THAT INCREASE WATER INFILTRATION AND REDUCE EVAPORATION.

Tips for implementation

Mulch: Woody pruning from trees should be chipped into small pieces (5-10 cm) to ensure that they biodegrade relatively quickly (thereby returning the nutrients back to soil). It is also recommended that mulching materials be spread 3-4 inches away from the tree trunk, in a thickness not exceeding 2-3 inches, and so as to provide good cover to the root system of the trees. Thick mulches can act as places for mice and rodents to live and multiply. See Practice 7.5 for more information about the creation of mulch from chipping tree residuals.

Cover crops: Mixtures of grass and legume pasture species are recommended as cover crops for mango orchards. However, excessive legume dominance can lead to a surplus of nitrogen that can affect fruit quality.

WHERE TO GET MORE INFORMATION

English:
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/99273/managing-citrus-orchards-with-less-water.pdf

Spanish:
http://www.fao.org/ag/ca/training_materials/cd27-spanish/sm/soil_moisture.pdf

2.7.

THE POTENTIAL FOR FERTILIZER AND AGROCHEMICAL CONTAMINATION OF SURFACE AND GROUND WATER IS ASSESSED AND MITIGATED WHEN/IF NEEDED.

DESCRIPTION

Your farm regularly assesses the potential for contamination of nearby ponds, lakes, streams, coastal waters, and underground sources of drinking water, resulting from fertilizer and agrochemical use. If contamination risk is high the farm will take the appropriate actions to mitigate the situation, including (but not limited to):

- Installation of sediment traps: constructed 'basins' or depression on a watercourse where sediment settles out and accumulates, allowing for its removal.
- Review and/or improve nutrient use efficiency.
- Integrated pest management (IPM) is used as the primary pest control strategy (see Practice 6.1).
- Use cover crops to keep nutrients out of the water by recycling excess nitrogen and reducing soil erosion.

Implementation Cost

Low cost.
Costs related to laboratory analysis.

Maintenence Cost

Variable cost.
The implementation cost of mitigation measures in case of high water contamination risk which can vary from low (e.g. improvement of soil infiltration) to medium/high (e.g. sediment trap, detention area, etc.).

Benefits

Agriculture is both a cause and victim of water pollution. Runoff carrying fertilizers and pesticides from fields to nearby surface and/or groundwater, is a well-documented cause of potentially deadly water contamination that affects the environment and communities. In turn, orchards that use contaminated water increase health risks for farm workers and consumers.

By assessing the potential for pollution of water bodies, you can take appropriate steps to mitigate and reduce the associated risks. This not only ensures the sustained viability of water reserves needed to maintain your mango operations in the future, but also protects the health of your workforce and local communities, and reduces reputational risks related to the contamination of shared water sources.

THE POTENTIAL FOR FERTILIZER AND AGROCHEMICAL CONTAMINATION OF SURFACE AND GROUND WATER IS ASSESSED AND MITIGATED WHEN/IF NEEDED.

Tips for implementation

The following questions can help you in assessing the risk posed by your farming practices to nearby water bodies.

Type A questions:

- Is micro-irrigation used as the main irrigation system? Yes/No
- Is my orchard irrigation water use based on the following:
  - Meteorological data? Yes/No
  - Plant needs? Yes/No
  - Soil type? Yes/No
- Yes or No, are at least one of these practices in place to reduce water runoff?
  - Improvement of soil infiltration (Practice 2.6).
  - Use of mulch, cover crops, vegetated buffer areas, sediment traps to reduce sediment movement* (Practice 2.6).
- If there is a river or other water body crossing the orchard, is a 5 m buffer zone established to protect riparian habitat? Yes/No
- Has a detention area or basin been created to capture excess irrigation and storm runoff? Yes/No

Type B questions:

- Are there any drinking water wells in the vicinity? Yes/No
- Is your orchard using highly toxic pesticides? Yes/No
  - If yes, are there mitigation practices in place during application? Yes/No

Contamination risk is low when most answers to type A questions are “yes” and answers to type B questions are “no”. On the contrary, contamination risk is high when most answers to type A questions are “no” and answers to type B questions are “yes”.

When the contamination risk is high, it is recommended than you contact an accredited laboratory to test your runoff, as well as nearby surface and groundwater bodies.

Be prepared to quickly identify and address the source of pollution if tests identify contamination from your farm.

WHERE TO GET MORE INFORMATION

English:
http://www.fao.org/docrep/w2598e/w2598e04.htm
https://www.epa.gov/nutrientpollution/sources-and-solutions-agriculture
https://toxtown.nlm.nih.gov/text_version/locations.php?id=1

Spanish:
http://www.fao.org/docrep/W2598S/w2598s03.htm
http://academic.uprm.edu/gonzalezc/HTMLobj-917/aguamanualescorrentia.pdf

2.8.

RAINWATER IS HARVESTED ONSITE AND USED FOR IRRIGATION.

DESCRIPTION

Your farm has systems in place to capture, store, and filter rainwater for use in irrigation.

Implementation Cost

Medium cost.
Costs related to the design and construction of rainwater harvesting system, including storage and filtration infrastructure.
Cost could also include hiring an expert.

Maintenence Cost

Low cost.
Costs related to system maintenance and replacement of filters.

ELEMENTS OF A RWH SYSTEM

Catchment area
Filters
Treatment system
Storage
Overflow drainage.

Benefits

Rainwater harvesting (RWH) is a low-cost, easy-to-use, environmentally-friendly way to recover rainwater. In regions relying mainly on rain for irrigation, rainwater harvesting offers protection in low-rainfall years or where there is high inter-annual or seasonal variability. In other regions, rainwater harvesting reduces irrigation water costs and the consumption of groundwater.

In addition, rainwater is generally soft, with relatively low concentrations of chemicals. It is generally clean, except for any debris that enters into the harvesting system.

Tips for implementation

Before installing a rainwater harvesting system, ask the following questions:

- How much water do I need and how will it be used?
- How efficiently am I using water?
- How much rainfall do I have?
- What quality of water do I need?
- What catchment area do I have for rainwater harvesting?
- What are the costs of running a rainwater harvesting system in my region (pump, UV unit, maintenance)?
- Do I need any permits to install a rainwater harvesting system?

WHERE TO GET MORE INFORMATION

English:
https://ag.umass.edu/greenhouse-floriculture/fact-sheets/rainwater-harvesting

Spanish:
ftp://ftp.fao.org/docrep/fao/010/ai128s/ai128s00.pdf

3. ENERGY USE AND MANAGEMENT

ENERGY USE AND MANAGEMENT

Energy use is an important category of sustainability due to the associated risks of high cost and emissions of gases that cause global warming. Therefore, energy management is important for creating efficiencies and reducing these risks.

A sustainable farm is one that is cost efficient and reduces risks. The risk in this case is the reliance on fossil fuels as a source of energy and includes electricity bought from third parties. Best practices in this category are aimed at management of energy demand so that only energy efficient equipment is utilized, maintained and operated correctly by trained personnel. It also means a transition to renewable energy sources, such as solar or wind, and a decreased reliance on fossil fuels such as petroleum, oil, gas and coal (e.g. for electricity).

This chapter includes the following three (3) practices:

- 3.1. The amount of each type of fossil fuel used in production activities is known and tracked.
- 3.2. The amount of electricity, bought from a third-party provider, is known and tracked.
- 3.3. Energy efficiency is continuously improved.

3.1.

THE AMOUNT OF EACH TYPE OF FOSSIL FUEL USED IN PRODUCTION ACTIVITIES IS KNOWN AND TRACKED.

DESCRIPTION

Procedures are in place that accurately record the amounts of fossil fuels (e.g. petroleum, oil, gas) that are used for farm operations. These fuels are commonly used in tractors, farm trucks and farm machinery, such as water pumps. (Note this practice does NOT include electricity, see Practice 3.2).

Implementation Cost

Low cost.
Costs related to personnel that obtain and record data.

Maintenence Cost

No cost.

Benefits

Knowledge of costly inputs, such as fossil fuels, allows managers to effectively search for and implement efficiencies. An additional benefit for society is reduced atmospheric pollution, including the release of greenhouse gases.

Tips for implementation

At a minimum, the amount and type of all fossil fuels consumed is recorded on a monthly basis and the machinery (purpose) for which it was used. The reports are monitored by farm managers and used for decision-making purposes (including procurement, new procedures, etc.) (see Practice 3.3).

ENERGY TRACKING TOOL

Track all of your fossil fuel use, by making sure that personnel record amounts used in each piece of machinery. A supervisor can be made responsible for recording this information. An office worker can easily convert this information into a graph allowing you to see significant changes in use and manage your inputs with ease.

Fossil Fuel Type	Equipment	Amount used	units	Date (DD-MM-YYYY)	Supervisor
Gasoline	Water pump 1	10	liters	03-09-2017	M. Gonzalez
Diesel	Truck 1	50	liters	05-10-2017	J. Rodriguez
Natural Gas	Generator 1	8	kg	06-10-2017	M. Gonzalez

3.2.

THE AMOUNT OF ELECTRICITY, BOUGHT FROM A THIRD-PARTY PROVIDER, IS KNOWN AND TRACKED.

DESCRIPTION

Procedures to accurately record the amount of electricity used on your farm from a local utility are in place. Electricity is commonly used for farm machinery, such as water pumps and lights, etc.

Implementation Cost

Low cost.
Costs related to personnel that obtain and record data.

Maintenence Cost

No cost.

Benefits

Knowledge of costly inputs, such as electricity, allows managers to effectively search for and implement efficiencies. This decreases vulnerability to financial risks and reputation from the emissions of greenhouse gases (GHGs) linked to electricity production.

Tips for implementation

At a minimum, the amount of electricity and the machinery (purpose) for which it was used, is recorded on a monthly basis. The reports are checked and analyzed by farm managers to search for anomalies and areas in which efficiency gains and costs reductions can be found, such as operating at off-peak times, maintaining and updating machinery (see Practice 3.3).

ELECTRICITY TRACKING TOOL

Track electricity use for each meter that your farm may have. This information is often on monthly-bills. By analyzing usage, you can see dips or spikes, which you can then attribute to specific machinery, season or usage behavior by workers. An office worker can easily convert this information into a graph to analyze the data behavior.

Meter#	Month	Reading 1	Reading 2	kWh	Cost	Supervisor
1	April	23465	123565	100	$20	M. Gonzalez
2	April	3201	3251	50	$10	J. Rodriguez
1	May	123565	123765	200	$40	M. Gonzalez
2	May	3251	3351	100	$20	M. Gonzalez

3.3.

ENERGY EFFICIENCY IS CONTINUOUSLY IMPROVED.

DESCRIPTION

Systems are in place to seek greater efficiency from the machinery used on the farm. Energy efficiency improvements ensure that your farm is decreasing the intensity of electricity use, so that even if your farm increases the volume of mangos it produces the amount of energy that you use, does not increase.

Implementation Cost

Low cost.
Costs related to the ongoing identification of energy efficiency opportunities through the careful analysis of farm energy use, which can be undertaken by a farm manager.

Maintenence Cost

No cost.

Benefits

Reducing the amount of energy consumed can significantly reduce the cost of production as well as avoid reputational risk from GHG emissions.

Tips for implementation

Armed with knowledge of the energy usage statistics of farm machinery (see Practices 3.1 and 3.2), farm managers seek to gain efficiency improvements through, for example:

- Frequent maintenance or renewal of water pumps.
- Scheduling farm electricity use with your utility's off-peak times.
- Reducing farm vehicle use through optimization of trips.
- Planned tractor use.
- A no-idle policy for farm vehicles.
- Regular maintenance and renewal of all machinery.

WHERE TO GET MORE INFORMATION

English:
http://farmenergy.org/clean-energy-guide/energy-efficiency
https://www.nal.usda.gov/afsic/energy-efficiency

Spanish:
http://www.idae.es/index.php/mod.pags/mem.detalle/relcategoria.1034/id.93/relmenu.55
http://energia-rural.com/eficiencia-energetica-rural/

4. FERTILIZER USE AND MANAGEMENT

FERTILIZER USE AND MANAGEMENT

In addition to sunlight and water, mango trees need a variety of different nutrients to grow and produce beautiful, juicy and tasty fruits. In natural environments, these nutrients are obtained from the soil, thanks to its inorganic components and the decomposition of organic material.

To maximize crop production on farms, soil nutrients must often be augmented by adding fertilizers or compost. Commonly composed of three essential plant nutrients (N - nitrogen, P - phosphorus, and K - potassium), fertilizer's primary role in agricultural production is to promote crop growth and development.

Without doubt, fertilizer is a critical tool in any production system. However, fertilizer is often used inappropriately, which not only wastes money but can also cause harm to your crop as well as to the environment and local communities. Effects of chemical fertilizers on the environment include growth of algae and decreasing the levels of oxygen in water bodies, and they are also known to cause health risks like cancer and chronic diseases in humans, especially in children. Fertilizer mismanagement therefore, represents important financial, physical and reputational risks for your operation.

By implementing the seven (7) practices described in this chapter, you will be able to optimize fertilizer use, properly incorporate compost and other organic fertilizers, and minimize potential negative impacts for the environment and surrounding communities.

- 4.1. Fertilizer applications are based on soil and tree information.
- 4.2. Organic fertilizers are used whenever possible.
- 4.3. Practices are implemented to reduce nutrient loss into soil and waterway.
- 4.4. Fertigation is used in combination with micro-irrigation systems (when in place).
- 4.5. Fertilizer application equipment is inspected and calibrated.
- 4.6. Fertilizer applications are known and tracked.
- 4.7. Fertilizers containers are labeled and stored in clean and ventilated structures that impede their release to the environment.

4.1.

FERTILIZER APPLICATIONS ARE BASED ON SOIL AND TREE INFORMATION.

DESCRIPTION

Fertilizer application decisions (type, amounts, timing, location) is based on annual soil and foliage analysis together with realistic yield goals and tree needs.

Soil testing is essential to determine whether the soil's ability to meet the needs of the crop is within an optimum range, while foliage analysis provides information on nutrient levels in the plant. Periodic soil and foliage testing, combined with a good record-keeping system (see Practice 4.6) serves as a gauge to indicate whether soil fertility is increasing, decreasing, or remaining constant.

Implementation Cost

Medium cost.
Costs related to laboratory analysis. Soil and leaf nutrient testing will vary depending on the laboratory and country (see table).

Maintenence Cost

Low cost.
Costs related to record keeping and mitigation actions (if/when needed).

Country	Soil	Leaf
U.S.	$15-$20	$15-$20
Brazil	$25-$30	$20
Peru	$20	$23
Mexico	$40	$40
Guatemala	$25-$60	$55

Benefits

Applying fertilizer at a rate that coincides with crop and soil requirements improves crop yield and health, and reduces economic cost, as well as detrimental impacts to surface and groundwater quality related to nutrients lost through runoff and/or leaching.

FERTILIZER APPLICATIONS ARE BASED ON SOIL AND TREE INFORMATION.

Tips for implementation

It is recommended that a professional laboratory conduct your soil and plant nutrient testing.

Soil sample collection

- **Timing**: It is recommended that sampling be done at about the same time every year. It is best to wait a minimum of 30 days after applications of fertilizer, lime or sulfur.
- **Position**: It is recommended that sampling depth be determined to represent the root zone the plant will draw from.
- **Location**: It is recommended that soil samples be collected in representative locations and account for known sources of variability (major soil type changes, past cropping patterns, etc.).

Leaf sample collection

- **Timing**: It is recommended that leaf samples be taken from trees when they are in a dormant state, i.e. not flushing or flowering. Avoid sampling if the trees have been recently sprayed with nutrients (trace elements, etc.) or fungicides. The best time for taking leaf samples is between one and two months before flowering.
- **Position**: Collect leaves from the middle of the tree crown, from the four cardinal points, from normal branches recently matured from the previous flush of growth and from between four and seven months old.
- **Quantity**: 30-60 leaves per sample.
- **Location**: Collect leaves from trees of the same age and growing on similar soil.

WHERE TO GET MORE INFORMATION

Contact nearby laboratories for more information.

4.2.

ORGANIC FERTILIZERS ARE USED WHENEVER POSSIBLE.

DESCRIPTION

When soil fertility needs to be enhanced, your operation chooses organic fertilizers including compost, manure and microbial fertilizers (composed of organic material and some source of sugar or starch, which are fermented together with specific species of microorganisms).

Implementation Cost

Medium cost.
Costs related to the purchasing or the production of organic fertilizers.
The implementation costs can be offset if organic fertilizers are made in-house (eg. compost).

Maintenence Cost

No cost.

Benefits

Unlike inorganic fertilizers, natural and organic fertilizers feed your mango trees while building soil. Soils with high levels of organic material not only remain loose and airy, hold more moisture and nutrients and foster growth of soil organisms, but also promote healthy plant root development.

Organic fertilizers can often be made from discarded organic materials (vegetation, fruit, etc.) present on your farm, and therefore can reduce costs related to the buying fertilizers from third party vendors.

Tips for implementation

- Check the quality of organic fertilizer (principally compost and manure) through laboratory analysis every time a new source of organic fertilizer is used or composting method changed.
- Wash and disinfect application equipment immediately after application.
- Record the date, composition and quantity of the compost applied
- Base application on plant and soil needs.

See Practice 7.4 for more information about making compost from fruit and wood waste.

4.3.

PRACTICES ARE IMPLEMENTED TO AVOID NUTRIENT LOSS INTO SOIL AND WATERWAYS.

DESCRIPTION

Your farm implements the following practices to avoid loss of fertilizer into the soil and waterways:

- **Management practices:** Use of smaller amounts of fertilizer applied more frequently; use of slow release fertilizer; and, implementation of nutrient application efficiency techniques (application rate, timing and soil testing).
- **Land use practices:** Use of cover crops and other erosion mitigation practices (see Practice 5.1), reduced tillage.
- **Edge-of-field practices:** Planting of a buffer of natural vegetation along streams (see Practice 8.3), harvesting of floodwater, re-establishing of wetlands.

Implementation Cost

Management practices: No cost.
Land use practices: Low cost. Costs related to planting cover crops.
Edge-of-field practices: Medium cost. Costs related to setting up buffer zone, creating the proper infrastructure for buffer zone, floodwater harvesting and re-establishing of wetlands.

Maintenence Cost

Management practices: No cost.
Land use practices: Low cost. Costs related to time and resources (water, energy, etc.) needed to maintaining cover crops.
Edge-of-field practices: Low cost. Costs related to time and resources (water, energy, etc.) needed to maintaining buffer zone, floodwater harvesting infrastructure and wetland. and tillage systems.

Benefits

The efficient use of fertilizer reduces cost and protects soil health and fertility.

Fertilizer runoff from agricultural land poses a serious threat to the world's waterways and oceans, leading to health issues and the loss of economic activities, such as fishing.

EUTROPHICATION

Eutrophication is the excessive presence of nitrate or phosphate in water bodies which encourages algae growth, forming a bloom over the water surface. Although eutrophication can be a natural process in lakes, occurring as they age through geological time, it is usually due to fertilizers being when washed off the land by rainwater into rivers and lakes. The Millennium Ecosystem Assessment (MA) found that human activities have resulted in the near doubling of nitrogen and tripling of phosphorus flows to the environment when compared to natural values.

In addition to the impairment of many freshwater and coastal marine ecosystems in the world, eutrophication can have important health risk on population, the most important being the blue baby syndrome, i.e. the inhibition of infants' ability to incorporate oxygen into their blood.

WHERE TO GET MORE INFORMATION

Consult local agriculture authority for more information about water quality parameters.

4.4.

FERTIGATION IS USED IN COMBINATION WITH MICRO-IRRIGATION SYSTEMS (WHEN IN PLACE).

DESCRIPTION

When micro-irrigation systems are in place on your farm, they are also used to apply fertilizers and amendments.

Implementation Cost

Variable cost. Fertigation is only possible through sprinkler or micro-irrigation systems which are the costliest type of irrigation systems (see Practice 2.1).

In addition to the micro-irrigation system, fertigation also requires fertilizer mixing stations, and a fertilizer pump, in addition to a filter and a backflow prevention valve.

Maintenence Cost

Low cost. Costs related to routine checks and reparations of the fertigation system. Maintenance costs can be offset by reduced requirements for labor and farm machinery, when compared to traditional fertilizer application.

Benefits

Fertigation using drip or subsurface drip irrigation allows nutrients to be applied directly to the wetted root volume, where roots are concentrated. As with water, the use of micro-irrigation technology to apply fertilizer increases precision. Applying proper rates of organic and inorganic fertilizer can minimize the risk of nutrient-related pollutants reaching ground and surface waters.

Benefits of fertigation include:

- Greater precision of fertilizer application.
- Reduction in labor costs.
- Better nutrient absorption.
- Reduction of fertilizer and water consumption (and therefore cost).
- Minimization of the potential for non-point source water pollution.

Tips for implementation

- In pressurized irrigation systems, ensure the pressure of the injected fertilizer solution is greater than the internal pressure.
- Ensure the fertilizer solution will not damage the irrigation system components as a result of its acidity.
- Avoid large applications of fertilizer in favor of smaller applications made over the course of the growing season.
- Flush the system following each fertigation with enough water to clean the water lines, but not enough to cause leaching.

See Practice 2.1. for additional information on micro-irrigation systems.

WHERE TO GET MORE INFORMATION

English:
ftp://ftp.fao.org/docrep/fao/010/a1336e/a1336e16.pdf

4.5.

FERTILIZER APPLICATION EQUIPMENT IS INSPECTED AND CALIBRATED.

DESCRIPTION

There is a system in place to ensure that fertilizer application equipment is routinely monitored and, where applicable, calibrated at least annually.

Implementation Cost

Low cost.
Costs related to the time and material needed for the inspection and calibration.

Maintenence Cost

Variable cost.
Varies whether the calibration is carried out by a specialized company, a supplier of fertilizer equipment or in-house.

Benefits

Accurate calibration of sprayers and spreaders allows for precise application of fertilizers. This not only preserves the environment and conserves resources, but also reduces the costs associated with fertilizer use, given that:

- Applying less nutrients than needed may not achieve objectives and may make a second application necessary, increasing costs.
- Using more nutrients than recommended may cause damage to the trees and increase costs.

Tips for implementation

It is recommended that:

- Information on the calibration and inspection be recorded in a log book: date, person in charge, calibration needed, etc.
- Calibration is carried out by a specialized company, supplier of fertilization equipment or by an employee with the required technical knowledge.
- Calibration is done for each granular product given that each product varies in density, size, active ingredient, and nutrient content.
- Each spreader be calibrated separately.

FERTILIZER APPLICATION EQUIPMENT IS INSPECTED AND CALIBRATED.

GLOBAL G.A.P. GUIDELINE FOR VISUAL INSPECTION AND FUNCTIONAL TESTS OF APPLICATION EQUIPMENT

- There shall be no leakages from the pump, spray liquid tank (when the cover is closed), pipes, hoses and filters.
- All devices for measuring, switching on and off, adjusting pressure and/or flow rate shall work reliably and there shall be no leakages.
- The nozzle equipment shall be suitable for appropriate application of the plant protection products. All nozzles shall be identical (type, size, material and origin), form a uniform spray jet (e.g. uniform shape, homogeneous spray) and there shall be no dripping after switching off the nozzles.
- All the different parts of the equipment (sprayer), e.g. nozzle holder/carrier, filters, blower, etc. shall be in good condition and work reliably.

Source: GLOBALG.A.P.

WHERE TO GET MORE INFORMATION

English:
http://plantscience.psu.edu/research/centers/turf/extension/factsheets/calibrating-spreader

Spanish:
http://www.fertilizando.com/articulos/Calibracion%20de%20los%20Equipos%20de%20Aplicacion%20Fertilizadores.asp

4.6.

FERTILIZER APPLICATIONS ARE KNOWN AND TRACKED.

DESCRIPTION

Producers keep records of fertilizer use data, including the date and area of application, product name, mix and doses. Data are stored with soil testing and foliage analysis results (see Practice 4.1), in an easy-to-use format to improve nutrient conservation techniques.

Implementation Cost

Variable cost. Costs related to the tool used to track applications. It can be low cost like Excel or higher cost if a specialized software is preferred. Potential cost savings of optimizing fertilizer applications.

Maintenence Cost

No cost.

Benefits

Accurate nutrient records are essential for evaluating and improving nutrient management decisions, and to document compliance with best practices and any regulatory requirements (and therefore reduce regulatory risk). Good fertilizer records together with soil information, allows farm managers to use fertilizers efficiently, thereby cutting costs and reducing harmful runoff.

Tips for implementation

It is suggested that records of fertilizer applications include the following information for all forms of fertilizers (including compost):

- Form (mix).
- Product name.
- Amount (doses).
- Source.
- Placement (area of application).
- Timing (date and frequency).
- Weather conditions.

Records will allow monthly and yearly application rates to be monitored.
It is recommended that producers analyze this information together with soil and leaf test results, yield data and cropping plans, to help plan future fertilizer management decisions.

FERTILIZER TRACKING TOOL

Track your nutrient use for each fertilizer application (inorganic or organic). A supervisor can be made responsible for recording this information. An office worker can easily convert this information into a graph allowing you to see significant changes in use and manage your inputs with ease.

Date	Form (mix)	Product Name	Amount (dose)	Cost	Area of application	Weather conditions	Supervisor

4.7.

FERTILIZERS CONTAINERS ARE LABELED AND STORED IN CLEAN AND VENTILATED STRUCTURES THAT IMPEDE THEIR RELEASE TO THE ENVIRONMENT.

DESCRIPTION

Fertilizers are kept in storage structures that are designed, built and equipped to limit negative impacts on workers, the environment and nearby communities. Individual fertilizer containers are kept closed and clearly labelled.

Implementation Cost

Medium cost.
Costs related to building the storage structure.

Maintenence Cost

Low cost.
Costs related to the frequent inspection and maintenance of the storage structure.

Benefits

Proper fertilizers storage reduces the risk of contamination to surface and/or groundwater. Excessive nitrate concentrations in drinking water are known to cause health risks while presence of phosphorus in surface waters has caused algae blooms and eutrophication.

Tips for implementation

- Establish fertilizer storage structures far from wells, rivers, streams or other water bodies or where runoff from the land, building roofs, or other surfaces could transport fertilizer to surface water.
- Store fertilizers in dry conditions and in an area separate from other chemicals.
- Always store liquid formulations below products with powder or granular formulation.
- Store only the amount of fertilizers required for short-term use on your farm.
- Although the storage structure should have an impermeable floor, store fertilizer sacks or other similar materials off the floor.
- Use steel shelves rather than wooden shelves as they are easier to clean if a spill occurs.
- Ensure that the fertilizer storage structure is locked and clearly identified. It is also recommended to display copies of the product labels on the windows and/or doors to give first responders information in case of a fire or spill.
- Visually monitor the storage sites to detect minor leaks before they become major.

WHERE TO GET MORE INFORMATION

English:
https://ag.umass.edu/greenhouse-floriculture/greenhouse-best-management-practices-bmp-manual/fertilizer-storage-handling

Spanish:
http://www.yara.com.pe/crop-nutrition/almacenamiento-y-manejo/almacenaje-de-fertilizantes/

5. SOIL MANAGEMENT

SOIL MANAGEMENT

The soil is a living ecosystem that fulfills many functions beyond physically supporting mango trees. A healthy soil provides nutrients, degrades waste, absorbs carbon, provides water, and supports a myriad of beneficial organisms that help control pests, among many other vital functions.

Soil degradation, whether caused by resource extraction, agricultural production, land use change or climate change (FAO 2015), directly affects the soil ability to support continued crop production (Table 1). This phenomenon poses critical threats to producers as poor soil represents not only a financial risk for mango agribusinesses (related to the costs associated with nutrient application and soil revitalization) but also a physical one, as continued degradation will eventually lead to a collapse in production.

Table 1. Direct impacts of soil degradation on specific soil functions of relevance to mango production (FAO, 2005).

	Soil Acidification	Soil biodiversity	Soil erosion	Soil Contamination	Soil compaction	Soil salinization	Nutrient imbalance	Soil organic carbon loss	Soil sealing	Waterlogging
Transformation and accumulation of soil organic matter	*	*	*					*	*	
Supply of nutrients	*	*	*	*		*	*	*	*	*
Transformation of contaminants				*						
Medium for seed germination and plant growth			*		*			*	*	
Regulation of water infiltration			*		*			*	*	
Retention and supply of water			*		*	*		*	*	
Drainage of excess water					*					*

As a mango producer, soil is your greatest asset. In order to protect it so that it supports maximal production today and well into the future, it is essential that sustainable soil management practices are implemented. The following practices are designed to help you do this.

This chapter includes two (2) practices:

- 5.1. A cover crop or resident vegetation is maintained between mango trees.
- 5.2. Equipment is selected and used to minimize soil compaction.

5.1.

A COVER CROP OR RESIDENT VEGETATION IS MAINTAINED BETWEEN MANGO TREES.

DESCRIPTION

Your farm maintains resident vegetation or cover crops (e.g. grasses, legumes, forbs or other herbaceous plants) that form a covering mat of living vegetation between mango trees, thereby reducing erosion.

Implementation Cost

Medium cost. Costs related to cover crop species planted (e.g. grasses, legumes, forbs or other herbaceous plants) and cover crop planting method. Implementation costs can be offset by the improvement of soil health.

Maintenence Cost

Medium cost. Costs related to cover crop species planted (e.g., grasses, legumes, forbs or other herbaceous plants) and tillage systems.

Benefits

Erosion can cause a loss of soil nutrients and microorganisms, leading to an unhealthy orchard and low productivity.

Cover crops and resident vegetation reduce erosion and costs by:

- Reducing the impact of rain on the soil and slowing overland flow of water.
- Providing a root system that helps stabilize the soil.
- Indirectly improving soil structure and water infiltration and reducing compaction.

Other benefits of cover crops include:

- Nutrient capture and leaching prevention.
- A cost-effective means of supplying the organic matter needed to maintain and improve soils.
- Habitat for beneficial insects.

DID YOU KNOW?

Use of various cover crops, especially multi-purpose crops, like nitrogen-fixing, soil-porosity-restoring, or pest repellent crops, is considered a best practice.

WHERE TO GET MORE INFORMATION

English:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ny/technical/?cid=nrcs144p2_027252
http://www.tropentag.de/2006/abstracts/full/386.pdf

Spanish:
http://www.mapama.gob.es/es/desarrollo-rural/temas/politica-forestal/0904712280144db0_tcm7-19627.pdf

5.2.

EQUIPMENT IS SELECTED AND USED TO MINIMIZE SOIL COMPACTION.

DESCRIPTION

Farm equipment is selected and used to minimize soil compaction. Practices include:

- Choosing the lightest equipment possible.
- Using the lowest acceptable tire pressure and greater-diameter tires.
- Avoiding the use of the same wheel tracks.
- Avoiding/minimizing traffic on fields when subsoil is wet.

Implementation Cost

Variable cost. Costs related to the optimization of equipment to reduce compaction and will vary depending on the changes needed.

Maintenence Cost

No cost.

Benefits

Soil compaction is a form of soil degradation that can result in decreased crop production. Soil compaction reduces the ability of water and air to filter through the soil, leading to a loss of soil organisms and fertility. Generally, compacted soil is also bare of cover vegetation, which leads to erosion and degradation. Implementing this practice is a key step in protecting the soil, your farm's most valuable resource.

WHERE TO GET MORE INFORMATION

English:
http://extension.psu.edu/plants/crops/soil-management/soil-compaction/avoiding-soil-compaction

Spanish:
http://www.fao.org/ag/ca/training_materials/cd27-spanish/sc/soil_compaction.pdf

6. PEST AND DISEASE MANAGEMENT

PEST AND DISEASE MANAGEMENT

Adequate control of pests and disease is a prerequisite for food production. Implementing sustainable practices for pest management is an essential part of ensuring that farming remains a sustainable endeavor. As mango producers know, the indiscriminate use of synthetic agrochemicals poses serious risks to the environment and human health, and can also lead to increased pesticide resistance. Consumers are also concerned about the health risks associated with pesticide residues on their food, as well as the environmental and health impacts of their use in production.

The risks associated with pesticide use include physical hazards, related to the availability of pest management tools and the effect pesticides have on the environment, as well as financial risks related to high prices, and high costs of compliance with regulatory bodies and customer requirements. Additionally, there are regulatory risks related to compliance with pesticide use and application standards as well as pesticide residue limits, both in the areas where mangos are grown and in markets where they are consumed. Finally, there are substantial reputational risks related to health and consumer perception.

Through the sensible integration of biological, cultural, and chemical controls, growers can develop an effective and efficient strategy that reduces economic risks as well as risks to the environment and human health. From a sustainability perspective, the mid- to long-term goal must be to reduce and eliminate the use of highly toxic substances, including agrochemicals, in food production. Related to this, pest and disease control and management based on integrated pest management (IPM) techniques and principles provides an economically, ecologically and socially sustainable basis for production.

To help you meet your pest and disease control goals in a sustainable manner, this chapter includes the following ten (10) practices:

- 6.1. Pests and disease are prevented and managed, based on integrated pest management (IPM).
- 6.2. The presence of fruit flies is regularly monitored and controlled.
- 6.3. Agrochemical containers are labeled and stored in structures that impede their release to the environment.
- 6.4 Empty agrochemical containers are triple-rinsed and disposed of safely.
- 6.5. Pesticide applications are known and tracked.
- 6.6. Pesticide residues on mangos are monitored.
- 6.7. The orchard is regularly monitored for pests and disease.
- 6.8. Organic and/or non-toxic pesticides are used whenever possible.
- 6.9. An integrated approach is taken to weed control, and efforts are made to reduce herbicide use.
- 6.10. Only pesticides that have been approved for use in national regulations and by the United States Environmental Protection Agency (US EPA) are applied.

6.1.

PESTS AND DISEASE ARE PREVENTED AND MANAGED, BASED ON INTEGRATED PEST MANAGEMENT (IPM).

DESCRIPTION

Your farm has developed and implements a plan based on integrated pest management (IPM), that prioritizes the use of physical, mechanical, biological, and cultural control methods, and uses the least possible amount of agrochemicals. The IPM plan includes preventative actions, observation, and monitoring, as well as steps to reduce the risk of pesticide resistance. Agrochemicals are only used when the damage from pests and/or disease exceeds pre-defined economic thresholds.

Implementation Cost

Medium cost. Costs related to the development of the plan, with the assistance of an external consultant where required.

Maintenence Cost

Medium cost. Costs related to the implementation of monitoring, record-keeping, and preventative and control actions.

Benefits

Reducing pesticide use is an important sustainability goal for any agricultural operation. In addition to reducing costs, lowering pesticide use limits the physical risk of pesticide resistance, reduces environmental impacts and health risks for workers and surrounding communities, as well as reputational risks related to the use of hazardous chemicals. A well designed and executed IPM plan can be a cost-effective and efficient method of pest and disease control.

Tips for implementation

An effective IPM plan involves at least the following actions:

- Obtain the advice of an external expert in IPM (unless you or an employee have specialized knowledge on IPM).
- Train workers on the principles of IPM and the techniques required for the implementation of your plan. Provide opportunities for specialized training for the employee(s) responsible for developing and implementing your IPM plan.
- Choose pest and disease resistant varieties.
- Monitor the presence of pests and disease (see Practices 6.2 and 6.7).
- Keep records of monitoring and control actions (see Practices 6.2, 6.5 and 6.7).
- Implement physical, mechanical, biological, and cultural control methods.
- Promote habitat diversification on your farm to increase populations of natural enemies (see Biodiversity section).
- Apply agrochemicals as a last resort, based on monitoring and economic thresholds, and in a way that minimizes health risks and pesticide resistance.

6.1.

PESTS AND DISEASE ARE PREVENTED AND MANAGED, BASED ON INTEGRATED PEST MANAGEMENT (IPM).

DID YOU KNOW?

The Food and Agriculture Organization (FAO) of the United Nations, defines integrated pest management as "the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment." The emphasis in IPM is on using natural pest control mechanisms and minimizing the disruption of agro-ecosystems.

An IPM plan should go beyond scheduling of pesticide applications based on monitoring and economic thresholds, and should include biological, physical, cultural and other control methods, making pesticide use a last resort.

WHERE TO GET MORE INFORMATION

English:
https://www.cipm.info/
http://www2.ipm.ucanr.edu/WhatIsIPM/
http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/ipm/en/
https://www.epa.gov/managing-pests-schools/introduction-integrated-pest-management

Spanish:
http://npic.orst.edu/pest/ipm.es.html
http://www.sagarpa.gob.mx/desarrolloRural/Documents/fichasaapt/Manejo%20integrado%20de%20plagas.pdf

6.2.

THE PRESENCE OF FRUIT FLIES IS REGULARLY MONITORED AND CONTROLLED.

DESCRIPTION

Your farm has developed and implemented a plan to monitor and control the presence of fruit flies. The plan implemented seeks to limit the proliferation of fruit flies through preventative measures that interrupt the life cycle of the fruit flies.

Implementation Cost

Medium cost.
Costs related to the development of the plan, with input from external consultants where necessary.

Maintenence Cost

Medium cost.
Costs related to monitoring and control activities.

Benefits

As a quarantine pest, control of fruit flies from production and through post-harvest is a vital part of ensuring that your farm's mangos comply with food safety and quality requirements and can be exported to international markets, such as the United States and Europe. High-quality fruit means higher revenues and increased well-being for the different sectors of the mango supply chain.

LIFE CYCLE OF FRUIT FLY

The life cycle of many fruit fly species (Family Tephritidae) is similar.

- The female fruit fly implants her eggs under the surface of the skin of fruits.
- When they hatch 2-4 days later, the larvae or maggots destroy the flesh of the fruit. The tunnels dug by the maggots also allow for secondary infection of the fruit by bacteria and fungi.
- The growing of the larvae or maggots accelerates fruit maturation and the fruit falls from the tree.
- The larvae leave the fruit and the pupae develop in the top few inches of soil.
- The adult fruit fly emerges from the soil, and begins to search the nourishment required to reach sexual maturity, couple, and lay eggs.

6.2.

THE PRESENCE OF FRUIT FLIES IS REGULARLY MONITORED AND CONTROLLED.

Tips for implementation

Control of fruit flies in mango orchards will likely involve the following steps:

1. Monitoring:

- Monitoring can be done using traps and/or sampling of fruit. When sampling fruit, the sample size will depend on the size of the orchard and the level of precision required. Sampled fruit should be taken from the trees and not fallen fruit
- Proper monitoring will provide the information needed to design control strategies.

2. Traps:

- Traps with different attractants can be used to attract adult fruit flies.
- Traps can be used to detect the presence of fruit flies, identify the area where they are prevalent, and also monitor the effectiveness of control measures in the orchard.
- When combined with pesticides, traps can also be used directly as a control method. The male annihilation technique (MAT) involves traps with the para-pheromone methyl eugenol, a male attractant, combined with an insecticide.

3. Orchard sanitation:

- Removal of dropped fruit as well as infected fruit on trees. It is recommended that this be done from daily to twice a week during the mango fruiting season.
- Composting or destroying dropped and infected fruit by covering with lime or soil. Infected fruit can also be destroyed by burning or placing the fruit in plastic bags or under impermeable plastic sheeting.
- Maintaining the orchard, particularly in the area around the trees, free of weeds.
- Avoiding the presence of host plants for the mango fruit fly near your orchard.
- Where fruit flies are present in neighbouring properties, it is recommended to establish barriers along the perimeters of the orchards with sacks and products that attract the fruit flies, to avoid contamination of your orchard.

4. Other control options:

- Biological control, particularly through the release of parasitoids.
- Localized pesticide treatment using food attractant systems in areas where the infestation has been observed through monitoring.
- In exceptional circumstances, pesticide treatment throughout the orchard.
- Plant-based compounds with insecticidal action, such as those derived from neem, can be used in fruit fly control (Verghese et al., 2006).

WHERE TO GET MORE INFORMATION

English:
http://theorganicfarmer.org/Articles/how-control-mango-fruit-flies
https://publications.cta.int/media/publications/downloads/1770_pdf.pdf

Spanish:
http://www-naweb.iaea.org/nafa/ipc/public/trapping-web-sp.pdf
http://www.promangord.org/publicaciones/mosca_fruta/Manejo_Mosca_Fruta.pdf
http://www.asohofrucol.com.co/archivos/biblioteca/biblioteca_25_las%20moscas%20de%20la%20fruta.pdf
http://www.cesavem.org/img/MoscasdelaFruta/moscasdelafruta.pdf

6.3.

AGROCHEMICAL CONTAINERS ARE LABELED AND STORED IN CLEAN AND VENTILATED STRUCTURES THAT IMPEDE THEIR RELEASE TO THE ENVIRONMENT.

DESCRIPTION

All agrochemicals on your farm are stored in a secure and structurally sound construction with an impermeable floor. The storage structure is physically separated (by a wall or sheeting) from any materials that could come in contact with the edible part of the crop, and complies with both national legislation and the requirements specified on agrochemical labels.

Storage facilities are designed to ensure agrochemicals pose no risk to workers, with sufficient natural or artificial illumination to allow labels to be read, and with sufficient ventilation of fresh air to avoid the accumulation of harmful vapors. Your farm has procedures to regulate access to the agrochemical storage area and the dispatching of all agrochemicals.

Implementation Cost

Variable cost.
Costs related to the construction or adaptation of a secure structure for agrochemical storage and elaboration of related procedures.

Maintenence Cost

Low cost.
Costs related to maintenance of the storage structure and implementation of procedures.

Benefits

A proper agrochemical storage structure and management procedures will assist your farm in minimizing risks related to agrochemical spills or misuse that could have negative effects for the environment and workers. Agrochemicals include many highly hazardous substances, and secure storage is key to preventing accidents.

6.3.

AGROCHEMICAL CONTAINERS ARE LABELED AND STORED IN CLEAN AND VENTILATED STRUCTURES THAT IMPEDE THEIR RELEASE TO THE ENVIRONMENT.

Tips for implementation

- Situate the agrochemical storage area at a sufficient distance from building used regularly by people, from public roads, water sources such as wells, and water bodies.
- Do not locate offices in the agrochemical storage area, unless agrochemicals are completely separated and proper ventilation is maintained.
- Maintain all agrochemicals in their original containers or sacks. In case of breakage, ensure the new container carries all the information from the original product label.
- Ensure shelves for agrochemical storage are made from a non-absorbent material, such as metal or rigid plastic, or are covered by an impermeable liner. Do not store agrochemicals directly on the floor.
- Design the agrochemical storage area to retain and control spills, with a sloped floor, retaining tanks, retention wall, and an absorbent inert material, such as sand, together with floor brush, dustpan and plastic bags, for use only in the event of an agrochemical spill.
- Organize agrochemicals by toxicity and type: insecticides, fungicides, herbicides, fertilizers, etc.
- Store only the amount of agrochemicals required for short-term use on your farm.
- Always store liquid formulations below products with powder or granular formulation.
- Maintain an up-to-date inventory of all agrochemical products in an easy-to-use format. It is also recommended to display copies of the product labels on the windows and/or doors to give first responders information in case of a fire or spill.
- Visibly display accident and emergency response procedures in the storage area (see Practice 10.9). Provide emergency response equipment (fire extinguisher, eyewash station, clean water, etc.).
- Do not store personal protective equipment (PPE) together with agrochemicals.
- Visually monitor the storage sites to detect minor leaks before they become major.
- Ensure that the storage structure is locked and clearly identified. Provide access to keys to the agrochemical storage facility only to those workers who have received relevant safety training (see Practice 10.6).

WHERE TO GET MORE INFORMATION

English:
http://mangofoodsafety.org/english/Farm/Mango_FSTK/Part2/FSTK_Farm_Part2.pdf
http://agrochemicals.iupac.org/index.php?option=com_sobi2&sobi2Task=sobi2Details&catid=3&sobi2Id=8&Itemid=19
http://npic.orst.edu/health/storage.html
https://www.epa.gov/safepestcontrol/storing-pesticides-safely

Spanish:
http://mangofoodsafety.org/espanol/Huerta/Mango_FSTK/Parte2/Manual_Huerta_Parte2.pdf
http://www.fao.org/3/a-v8966s.pdf
http://www.bvsde.paho.org/bvsacd/cd51/subsector/cap4.pdf

6.4

EMPTY AGROCHEMICAL CONTAINERS ARE TRIPLE-RINSED AND DISPOSED OF SAFELY.

DESCRIPTION

Your farm has procedures to ensure that all empty pesticide containers are triple-rinsed (see text box), safely stored, and returned to the manufacturer, sent to an authorized collection center or recycled.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to proper final disposal.

Benefits

Empty pesticide containers contain chemical residues and can therefore pose risks to the environment and human health. Properly rinsing pesticide containers protects workers, wildlife and the environment. This practice can also save your farm money by ensuring use of all the pesticide you purchased. Triple-rinsing and proper disposal may be legal requirements and are sound management and environmental practices.

Tips for implementation

- Do not reuse empty pesticide or other hazardous chemical containers for storage of food or water, or any other purpose.
- Triple-rinse all empty pesticide containers. Rinse empty containers immediately to avoid the pesticide mixture drying inside the container, as it may become difficult to remove.
- Properly dispose of the rinse water from containers by using it as part of spray mixture, according to label directions.
- Store triple-rinsed containers in a locked area (restricting access to people and fauna) with visible signage.
- Return triple-rinsed containers to the manufacturer, or if not possible, recycle them or deliver them to an authorized collection center.

EMPTY AGROCHEMICAL CONTAINERS ARE TRIPLE-RINSED AND DISPOSED OF SAFELY.

HOW TO TRIPLE-RINSE EMPTY PESTICIDE CONTAINERS

1. Use the same personal protective equipment for rinsing as required on the pesticide label.
2. Empty the container contents into the spray tank and allow to drip for an additional 30 seconds.
3. Rinse the container immediately, as content may become difficult to remove.
4. Fill the container ¼ full of water.
5. Replace the cap on the container and shake for 30 seconds.
6. Drain the contents into the spray tank as described above.
7. Repeat steps 4 to 6 twice, shaking the container in different directions.
8. Puncture or crush the container so it cannot be reused.

WHERE TO GET MORE INFORMATION

English:
http://mangofoodsafety.org/english/Farm/Mango_FSTK/Part2/FSTK_Farm_Part2.pdf
https://pesticidestewardship.org/homeowner/pesticide-and-container-disposal/
https://www.gpo.gov/fdsys/pkg/CFR-2011-title40-vol24/pdf/CFR-2011-title40-vol24-sec156-146.pdf
http://extensionpublications.unl.edu/assets/pdf/g1736.pdf

Spanish:
http://campolimpio.org.mx/plan-de-manejo/triple-lavado
http://www.conadesuca.gob.mx/DocumentosEficProductiva/5.-%20Sustentabilidad/4.%20PNREVA/4-2%20Triple%20lavado%20Campo%20Limpio.pdf
https://rhes.ruralhorizon.org/uploads/documents/link_9._gu%C3%ADa_ambiental_envases_agroqu%C3%ADmicos.pdf

6.5.

PESTICIDE APPLICATIONS ARE KNOWN AND TRACKED.

DESCRIPTION

Your farm tracks all pesticides used, maintaining records with the following information:

- Product name(s) and active ingredient(s).
- Dosage and total volume applied.
- Target pest or disease.
- Location and size of application area.
- Date and end time of application.
- Name of applicator(s).
- Equipment used.
- Pre-harvest interval.

This information is maintained in an easy-to-use format, and analyzed to determine trends and support efforts to reduce agrochemical use.

Implementation Cost

Low cost.
Costs related to developing procedures for pesticide tracking. Costs may also be related to the use of a paid software application.

Maintenence Cost

Low cost.
Costs related to maintaining records.

Benefits

Maintaining accurate records of pesticide use allows your farm to analyze the effectiveness of applications by cross-referencing with pest monitoring data. These records can be used to analyze trends in pesticide use, set goals for reduction and monitor progress. Complete records may be a legal requirement and are a best practice.

Tips for implementation

It is recommended that your farm designate one or more supervisors as responsible for authorizing pesticide applications, including the product, dosage, and method of application.

6.5.

PESTICIDE APPLICATIONS ARE KNOWN AND TRACKED.

PESTICIDE TRACKING TOOL

Date	Start time / Restricted entry interval	Application site location/ description	Pesticide brand name and formulation	EPA Regulation No. / Active ingredient	Target pest or disease	Application rate / Size of area treated	Completion time	Pre-harvest interval	Applicator's Name / Equipment used
	AM PM						AM PM		
	AM PM						AM PM		

WHERE TO GET MORE INFORMATION

Free and paid software applications exist to assist in pesticide record keeping. For examples of free software, see: http://www.extension.iastate.edu/article/pesticide-record-keeping-made-easy-mobile-app

6.6.

PESTICIDE RESIDUES ON MANGOS ARE MONITORED.

DESCRIPTION

Your farm has developed and implements a plan to assess the risk of pesticide residues on mangos, based on the Maximum Residue Levels (MRLs) permitted in target markets. Pesticide residues are avoided through minimizing pesticide use, particularly near harvest, and monitoring of residues is conducted when required based on risk assessment.

Implementation Cost

Low cost.
Costs related to analysis of information on Maximum Residue Levels and conducting risk assessment.

Maintenence Cost

Variable cost.
Costs related to residue-testing, if risk assessment determines it is required. Residue testing costs between US$175-$350, depending on the laboratory and country.

Benefits

Pesticide residues are a health concern for consumers and are regulated on food products imported to key markets such as the United States and Europe. These residues may also be an indicator of the use of hazardous agrochemicals on your farm, with potential environmental impacts.
Eliminating pesticide residues on fruit, or minimizing levels, will help growers avoid regulatory and reputational risks, and may help promote the image of mangos as a healthy fruit.

Tips for implementation

- Maintain up-to-date information on the Maximum Residue Levels (MRLs) for markets where fruit is exported.
- Take these MRLs into account when implementing pest and disease control actions. Note that MRLs for export markets may be stricter than for the domestic market, and adjust control strategies accordingly.
- Assess risk of non-compliance with MRLs and conduct residue analysis when required.
- Residue analysis may not be required when no agrochemicals are used on the mangos, or when none are used close to harvest (with an interval significantly longer than the post-harvest interval).
- When residue analysis is required, implement using an accredited laboratory and with proper sampling procedures.
- Take proper action where MRLs are exceeded.

PESTICIDE RESIDUES ON MANGOS ARE MONITORED.

DID YOU KNOW?

In the United States, the Environmental Protection Agency (EPA) is responsible for setting pesticide tolerances, or the maximum level of pesticide residues permitted on human and animal food. Enforcement of these tolerances is the responsibility of the Food and Drug Administration (FDA). The FDA regularly monitors imported food, as well as domestic foods shipped between states.

The Environmental Working Group (EWG), a U.S. non-profit, places mangos on its "clean fifteen" list of fruits and vegetables with lower levels of pesticide residues. Source: EWG

WHERE TO GET MORE INFORMATION

English:
http://www.fao.org/fao-who-codexalimentarius/standards/pestres/en/
http://www.fda.gov/ICECI/ComplianceManuals/CompliancePolicyGuidanceManual/ucm123236.htm
https://www.epa.gov/pesticide-tolerances

Spanish:
http://www.fao.org/fao-who-codexalimentarius/standards/pestres/es/
http://npic.orst.edu/reg/intreg.es.html

6.7.

THE ORCHARD IS REGULARLY MONITORED FOR PESTS AND DISEASE.

DESCRIPTION

Your farm implements a regular monitoring program for pests and disease, and uses the monitoring information to make decisions on pest and disease control. Workers are regularly trained to carry out monitoring activities.

Monitoring is an important aspect of integrated pest management (IPM) (see Practice 6.1).

Implementation Cost

Low cost.
Costs related to the development of procedures and training on monitoring activities.

Maintenence Cost

Medium cost.
Costs related to the labor involved in monitoring activities.

Benefits

Appropriate knowledge and regular monitoring of mango pests and disease will assist your farm in making decisions on control methods. Effective monitoring will allow for action to be taken only in those parts of the orchard where required, and when damage by pests or disease reaches a level that justifies treatment by chemical pesticides. Monitoring will help avoid excess costs and risks related to indiscriminate pesticide use, and will help prevent the development of pesticide resistance.

Tips for implementation

- Train workers annually to identify and report pest and disease issues. Training should cover at least the following topics:
  - Principal pests and disease affecting mango cultivation in your region.
  - Conditions that place the orchard at risk.
  - Parts of the mango trees affected.
  - Pest lifecycles and possible host plants.
- Maintain written records of monitoring of pests and disease in an easy-to-use format.
- Analyze monitoring data to develop pest and disease control strategies.

WHERE TO GET MORE INFORMATION

Consult local agricultural authorities for further information.

6.8.

ORGANIC AND/OR NON-TOXIC PESTICIDES ARE USED WHENEVER POSSIBLE.

DESCRIPTION

Your farm has a policy to ensure that whenever possible, organic and /or non-toxic pesticides are used, as part of efforts to minimize the use of higher toxicity agrochemicals.

Implementation Cost

Low cost.
Costs related to analysis of organic and non-toxic pesticide alternatives available in your market.

Maintenence Cost

Variable cost.
Costs related to the purchase or production of non-toxic alternatives to toxic agrochemicals.

Benefits

Using organic and/or non-toxic pesticides on your farm has several benefits. This practice reduces risks to human health and the environment, related to the handling and application of agrochemicals. It can also be part of efforts to reduce pesticide residues on your crop. Use of highly toxic pesticides, particularly those prohibited in export markets, could limit access to those markets and expose your farm to regulatory and reputational risks. These risks are avoided by eliminating the use of highly toxic chemicals.

If part of efforts to obtain organic certification, this practice could help your farm access preferential markets.

Tips for implementation

- Develop a policy to ensure that non-toxic options are chosen over chemical alternatives whenever they will be effective given the pest or disease control issue.
- Investigate the organic and/or non-toxic pesticides available in your region or that you can produce yourself onsite.
- Consult with experts in organic production and/or biological control to obtain advice for your specific pest and disease control issues.

WHERE TO GET MORE INFORMATION

Consult local agriculture authorities for more information.

English:
https://www.agric.wa.gov.au/mangoes/organic-mango-production-strategies-and-methods?page=0%2C5
http://www.oisat.org/downloads/field_guide_mango.pdf

Spanish:
http://www.cofupro.org.mx/cofupro/images/contenidoweb/indice/Publicaciones-Sinaloa/Paquetes-tecnologicos-2008-2009/Manejo%20organico%20de%20mango.pdf
http://www.somas.org.mx/pdf/pdfs_libros/agriculturasostenible5/5_1/78.pdf

6.9.

AN INTEGRATED APPROACH IS TAKEN TO WEED CONTROL, AND EFFORTS ARE MADE TO REDUCE HERBICIDE USE.

DESCRIPTION

Your farm takes an integrated approach to weed control, with herbicides being used for spot treatment and only after an analysis of alternatives. The decision to use herbicides is based on the presence of weeds in the orchard and a lack of alternative means of control.

Alternative weed control methods include:

- Hand-weeding with small hand tools.
- Mechanical weeding: Weeding tool attached to tractor, tiller or other equipment.
- Use of herbivores or biological control.
- Cover crops: Cover crops can be used to suppress weed growth, and can also be a source of alternative income in the early stages of tree growth. Certain cover crops can also improve the health of trees in the orchard (see Practice 5.1).

Implementation Cost

Low cost.
Costs related to developing procedures for an integrated approach to weed control.

Maintenence Cost

Low cost.
Costs related to monitoring the presence of weeds and implementing alternative controls.

Benefits

Prioritizing non-chemical weed control options will reduce the use of hazardous chemicals on your farm and minimize potential harm to human health and the environment. Using alternative methods can also reduce costs by decreasing herbicide consumption.

WHERE TO GET MORE INFORMATION

English:
http://e-tesda.gov.ph/Fruit_Grower/Mod4/M4_L1_weedingcontrol_mango.html
http://www.ikisan.com/ap-mango-weed-management.html

Spanish:
http://www.redalyc.org/articulo.oa?id=93920942009

6.10.

ONLY PESTICIDES THAT HAVE BEEN APPROVED FOR USE IN NATIONAL REGULATIONS AND BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (US EPA) ARE APPLIED.

DESCRIPTION

Your farm uses only pesticides that have been approved by the United States Environmental Protection Agency (US EPA) for use on mangos, and they are applied and used in a manner compliant with the instructions and restrictions provided on the pesticide label approved by the US EPA. All pesticides used on your farm also comply with national regulations, and you ensure the strictest regulations, whether national or EPA, are always applied.

Implementation Cost

Low cost.
Costs related to review of the pesticides approved/ not approved for use on mangos by US EPA and in national regulations.

Maintenence Cost

No cost.

Benefits

US pesticide regulations are often stricter than those in effect in the countries where mangos are grown. Using only US EPA approved pesticides reduces the health and environmental risks associated with pesticides that have not undergone an expert review and approval process. Complying with the instructions for pesticide use established in EPA-approved labels will further help protect workers and minimize environmental impacts. This policy may also reduce reputational risks related to the use of prohibited pesticides, and avoid product rejection for this reason.

DID YOU KNOW?

In addition to using only pesticides approved by the US EPA for mango cultivation, it is recommended that all products on the following list be avoided on your farm:

* Pesticides identified as extremely or highly toxic (WHO Classes Ia or Ib, EPA acute toxicity Class I).
* Pesticides included in Annex III of the Rotterdam Convention that are prohibited or severely restricted by the United Nations Environmental Program's Prior Informed Consent (PIC) program (http://www.pic.int/).
* Persistent Organic Pollutants (POP) included in the Stockholm Convention (http://chm.pops.int/).

ONLY PESTICIDES THAT HAVE BEEN APPROVED FOR USE IN NATIONAL REGULATIONS AND BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (US EPA) ARE APPLIED.

Tips for implementation

- Develop a policy that only pesticides approved for mango cultivation by both the US EPA and in national regulations be used on the farm.
- Ensure all workers are aware of this policy and integrate it into training programs.
- Review current regulatory status in the US of all pesticides used on the farm, to determine if they are approved for use on mangos by the US EPA.
- Phase out use of all pesticides not approved for use on mangos in the US as well as in national regulations.

WHERE TO GET MORE INFORMATION

English:
https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1

Spanish:
hhttps://espanol.epa.gov/espanol/productos-pesticidas-ilegales
https://home.agrian.com/

7. WASTE MANAGEMENT

WASTE MANAGEMENT

Food waste, from field to plate, is emerging as a major topic of concern in agricultural production and distribution. Every wasted mango has received the same inputs - such as labor, water, fertilizers, and energy - as those that eventually reach the consumer. Reducing fruit waste is therefore not only a way to better allocate human and natural resources, but also a way for producers to ensure that each dollar invested in their orchard is spent on fruits that will reach consumers and generate revenue. Although reduction of waste should be the primary management strategy, fruit waste is unavoidable. It is essential that discarded fruit is managed correctly, so that it enters a secondary food stream or, if waste is unavoidable, it produces no environmental impact, or risk of food contamination. produces no environmental impact, or risk of food contamination.

Growing mango trees absorb carbon dioxide from the atmosphere and can help reduce the effects of climate change. However, when wood waste is poorly managed, it emits carbon dioxide into the atmosphere, thereby contributing to climate change and to the overall carbon footprint of your mangos. At a time when many consumers avoid foods with a high carbon footprint, it is essential to properly manage dead wood from pruning or felling, to protect the atmosphere and minimize your mangos' carbon footprint.

Proper waste management is key to a sustainable mango production strategy, and many solutions to waste problems are easy to implement and can yield significant results. Sustainable waste management implies not only reducing waste, but capturing and returning what remains as a resource back into the economy. The following chapter provides mango producers with good practices to guide their waste management process while unlocking tremendous environmental and economic opportunities.

This chapter includes six (6) practices:

- 7.1. Open garbage dumps and open burning of waste are not permitted.
- 7.2. The area surrounding dumpsters, waste containers and compactors is regularly maintained and inspected.
- 7.3. Discarded mangoes are donated.
- 7.4. Organic waste is separated from other types of waste for composting.
- 7.5. Tree residue is chipped then used as mulch.
- 7.6. Tree residues are repurposed.

7.1.

OPEN GARBAGE DUMPS AND OPEN BURNING OF WASTE ARE NOT PERMITTED.

DESCRIPTION

All garbage is disposed of in closed containers and there is no burning of waste, including wood and other green residues from the farm.

There is a system in place to ensure cleaner healthier solutions to garbage disposal. Your farm implements alternatives to onsite open garbage dumps or open burning of waste, including:

- Donations of food waste to nearby communities, local organizations or as cattle feed (see Practice 7.3).
- Composting of waste (see Practice 7.4).
- Repurposing of waste (see Practice 7.6).
- Closed containers for waste collected by a proper authority.
- Waste-to-energy incinerators.

Implementation Cost

Low cost.
Costs related to finding alternative to burning of waste.

Maintenence Cost

No cost.

Benefits

Sustainably managing your waste reduces the environmental impact of your operation:

- Open waste dumping attracts rodents and pests and poses serious threats to groundwater resources and soil resulting from the leaching of toxic chemicals.
- Open burning of waste leads to the release of many air pollutants and hazardous byproducts, including heavy metals, dioxins and furans.

WHERE TO GET MORE INFORMATION

Contact your municipality to obtain information on landfill operations, solid waste collection services, transfer stations and recycling facilities.

English:
https://www.env.nm.gov/aqb/projects/openburn/OKopenburnfactsheet.pdf

Spanish:
http://www3.cec.org/islandora/en/item/11405-la-quema-de-residuos-agr-colas-es-una-fuente-de-dioxinas-es.pdf

7.2.

THE AREA SURROUNDING DUMPSTERS, WASTE CONTAINERS AND COMPACTORS IS REGULARLY MAINTAINED AND INSPECTED.

DESCRIPTION

The area surrounding dumpsters, waste containers and compactors is inspected at least once a month for leaks, spills, litter and pests, and corrective actions are taken when needed.

Corrective actions include:

- Replacing leaking containers.
- Increasing recollection frequency.
- Applying absorbent materials (e.g., kitty litter) over any liquids spilled.
- Placing liquid waste in closed/sealed containers.
- Sweeping the loading dock area regularly.
- Adopting regular dumpster-area cleaning procedures that include sweeping and using environmentally friendly soaps.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Poor management of waste receptacles and surrounding areas can lead to an increase in pests and contaminate surface and ground water resources. Maintaining this area clean and free from leaks and debris will aid in food safety efforts, protect the environment and ensure a clean working environment for your employees.

Tips for implementation

Develop a dumpster area maintenance procedure including:

- Creation of an inspection checklist.
- Definition of clear steps to keep area clean.
- Training the person in charge of inspection.
- Posting of signs that indicate the materials that can be placed in the dumpster.
- Completion of a brief inspection report.

7.2.

THE AREA SURROUNDING DUMPSTERS, WASTE CONTAINERS AND COMPACTORS IS REGULARLY MAINTAINED AND INSPECTED.

INSPECTION CHECKLIST

The inspection checklist should also include a diagram of area (use drawings to identify/locate hazards) and an inventory of equipment (type of machinery or equipment that is present).

Items	Yes	No	Observation
Is safe access to food waste and trash containers maintained?			
Is the disposal area free from broken glass, metal cans and food spillage?			
Are food waste and refuse containers adequate in number and are they insect/rodent proof?			
Are there proper holding racks and/or dollies for garbage containers?			
Is combustible trash stored away from the building?			
Is smoking forbidden in trash storage areas?			
Are dumpster covered & drain plug(s) in place?			
If garbage bags are used, are they properly sealed and placed (not thrown)?			

7.3.

DISCARDED MANGOES ARE DONATED.

DESCRIPTION

There is a system in place to donate fruit that is unfit to be sent to the packinghouse. Potential beneficiaries of mangos include: food banks, nearby populations in need, cattle ranchers, etc.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the transportation of mangos (when not provided by the receiver).

Benefits

Donating edible discarded fruit for human or animal consumption has been identified by the Food and Agricultural Organization of the United Nations (FAO) as the best way of addressing food waste while also fighting food poverty.

Tips for implementation

Determine the frequency and quantity of food waste that can be donated, as this will help beneficiaries plan the pick-up schedule.

WHERE TO GET MORE INFORMATION

Ecuador:
http://diakonia-ec.org/como_ayudar

Peru:
http://bancodealimentosperu.org/

Mexico:
https://bamx.org.mx

Brazil:
www.sesc.com.br/mesabrasil

FOOD BANKS

The reduction of food waste at the farm level is a great opportunity for mango producers to not only reduce their environmental footprint, but also to have good press on an issue that matters to consumers.

Food banks that collect food for redistribution have been established in different countries of the region, including Costa Rica, Chile, Guatemala, Argentina, the Dominican Republic, Brazil, Ecuador, Peru and Mexico. The Association of Food Banks of Mexico, for example, is a non-profit organization that coordinates a network of 61 food banks all over the country.

In Brazil, various organizations are present across the country to ensure that food waste is recovered and distributed to populations in need. In fact, there are currently 67 food banks operating in the country. One of them is Mesa Brasil (www.sesc.com.br/mesabrasil), a food and nutrition security program of the Serviço Social do Comércio (SESC), part of the Brazilian National network against hunger and food waste (Rede Nacional de Banco de Alimentos). In 2011, Mesa Brasil, with an office in Petrolina, distributed 38,793 tons of food (donated by retailers, food and horticultural companies, etc.) to over 1.49 million people in 389 cities across the country, with the assistance of 5,594 organizations and 3,248 partner companies.

7.4.

ORGANIC WASTE IS SEPARATED FROM OTHER TYPES OF WASTE FOR COMPOSTING.

DESCRIPTION

Fruit that is unfit to be sent to the packinghouse, as well as tree trimmings, leaves and other green residues, are diverted from the general waste stream and used to prepare compost.

Implementation Cost

Variable cost.
Costs related to the purchase of equipment to turn the compost pile and will vary depending on whether the producer choses to use existing equipment (such as a front loader) or decides to invest in special equipment designed specifically for this purpose.

Maintenence Cost

Low cost.
Costs related to ensuring the compost is properly taken care of.
Costs can be offset if compost is used as organic fertilizer.

Benefits

The production of compost allows for a high volume of organic waste to be kept out of landfills and turned into a natural organic fertilizer. This prevents the emission of methane, a greenhouse gas 25 times stronger than carbon dioxide. Given that poorly managed compost can also produce methane, it is imperative to implement the composting system correctly.
This practice also represents a potential cost savings as compost can be used in lieu of costly inorganic fertilizer.

Given the high temperatures required for proper composting (between 131 and 170°F), composting unfit mangoes can also contribute to reducing fruit fly populations in the orchard, by killing larvae present in the fruit (if temperature of the compost is uniformed).

Tips for implementation

- Ensure the compost maintains a temperature of between 131 and 170°F for 3 days (enclosed system) or 15 days (windrow system). During this period, turn the composting materials a minimum of five times. After these steps, cure the compost pile for 45 days. Cover any finished and curing compost piles in order to prevent recontamination.
- Maintain the composting site dry, well drained, and slightly sloped (1-2% best) and ensure it is located at least 100 meters from living areas, schools or other areas of daily human activity.
- Keep detailed records of pile type (aerobic vs. anaerobic, enclosed, windrow, etc.), temperature and moisture management, dates turned, and the duration of high temperatures.
- Chip larger branches, tree trunks and stumps into 5-10 cm pieces before being added to the compost, to facilitate the decomposing process.

7.4.

ORGANIC WASTE IS SEPARATED FROM OTHER TYPES OF WASTE FOR COMPOSTING.

IS YOUR COMPOST READY TO USE?

- **Test its temperature:** Compost that is significantly warmer than ambient conditions might not be mature for use.
- **Smell it:** Immature compost often has an unpleasant smell.
- **Visible food chunks:** A mature compost should take the form of a dark-brown or black organic substance.
- **Woodiness:** If the texture of your compost is too woody, it might be preferable to use it as mulch instead of compost.

WHERE TO GET MORE INFORMATION

English:
http://www.fao.org/docrep/014/i2230e/i2230e14.pdf

Spanish:
http://www.fao.org/3/a-i3388s.pdf

7.5.

TREE RESIDUES ARE CHIPPED THEN USED AS MULCH.

DESCRIPTION

Tree residues (large branches and trunks) are chipped and used as mulch by spreading them at the base of trees, to help maintain soil moisture and impede the growth of weeds.

Implementation Cost

Medium cost.
Costs related to producing mulch from larger branches, tree trunks and stumps, which will require appropriate machinery.

Maintenence Cost

No cost.

Benefits

As trees grow, they absorb carbon dioxide from the atmosphere and convert it to sugars and biomass that create woody material. In this way, atmospheric carbon dioxide becomes "fixed" as trees grow. The generation of mulch from tree residues (dead leaves, branches, tree trunks, etc.) allows for a high volume of wood waste to be kept out of landfills and turned into a high value soil protector. This practice prevents the emission of greenhouse gases that were fixed in the trees.

The benefits of organic mulch include:

- Conservation of soil moisture.
- Improved soil fertility and structure.
- Reduced erosion by protecting soil from rainfall impact.
- Control of weed growth.
- Calibration of soil temperature.
- Limiting surface run-off.

Tips for implementation

Chip woody pruning from trees into small pieces (5-10 cm) to ensure they biodegrade relatively quickly, thereby returning the nutrients back to the soil.

- The nature of your tree mulch will affect soil acidity.
- Acid mulches include: oak leaves, peat moss, and pine needles.
- Non-acidic mulches include: rice hulls, corncobs, grass clippings, sawdust (elm, hemlock, and locust), and leaves (except oak).

WHERE TO GET MORE INFORMATION

Consult your agriculture authority for more information.

7.6.

TREE RESIDUES ARE REPURPOSED.

DESCRIPTION

Tree residues (large branches and trunks) are either used on the farm or sold/given to factories to be repurposed into furniture, fences, boxes and/or construction material.

Implementation Cost

No cost.
Potential economic benefits can be achieved if tree residue is sold.

Maintenence Cost

No cost.

Benefits

Mango trees store carbon dioxide as they grow. Repurposing tree waste allows the carbon to remain sequestered for generations, instead of releasing it into the atmosphere immediately. This practice is environmentally responsible and supports a closed loop economy where waste in one industry is used as an input for another.

Tips for implementation

- When installations need to be built on your farm (e.g., fences), use tree residues as the construction material of choice.
- Contact local sawmills, plywood factories, furniture manufacturers to propose sale of mango tree waste.

8. BIODIVERSITY

USING BIODIVERSITY TO SUSTAIN LONG TERM PRODUCTION

Biodiversity is essential to agricultural production. Biodiversity provides services that include the production of soil nutrients, the pollination of flowers that grow into fruits, pest control, pollution clean-up and flood protection to name just a few. (Power, 2010) It is also key to sustaining the mechanisms that maintain a stable climate and adapting to a changing one. Biodiversity has tremendous financial value (Losey and Vaughan, 2006), for example, wild insects have been calculated to be worth more than $400 billion for their pollinator services alone. (Helmholtz Association of German Research Centres, 2010) Given the value of biodiversity, it is vital to protect natural habitat on the farm for long term sustained production.

However, striking a balance between agricultural production and biodiversity protection in agricultural landscapes is a global problem. Modern agricultural practices most often negatively impact biodiversity, which ultimately affects production potential and increases farming costs. Key examples include unsustainable demands on water for irrigation and excessive use of nutrients and chemical inputs that result in problems of pollution and eutrophication.

A sustainable farm recognizes the critical role that biodiversity plays in the productivity and health of the farm. For that reason, such farms protect biodiversity by managing natural habitat and reducing negative practices such as habitat destruction, loud noises, pollution and hunting. A sustainable farm also recognizes that actions taken on the farm are often felt across the entire landscape. For example, pollution of a river affects the entire watershed, and the destruction of natural habitat may remove essential breeding areas for pollinators that support the entire farming community.

Biodiversity protection is an essential part of sustainability and not only reduces production risks but also reduces reputational risks. Farmers that do not protect their natural resources risk affecting their reputation among their farming community and potentially their customers and consumers. For example, a successful consumer movement arose to lobby against the destruction of tropical forests by the palm oil industry. Consumers are a powerful voice and a growing number expect that their food does not harm natural ecosystems.

The following set of best practices outline what a sustainable farm can do to maintain biodiversity on their farm and enhance the ecological services that benefit production over the long term.

- 8.1. At least 10% of the farm area is maintained in its natural state.
- 8.2. Live fencing is used for borders and boundaries.
- 8.3. Riparian habitat is protected with a 5 m buffer zone.
- 8.4. Specific measures are taken to protect pollinators and other beneficial species.
- 8.5. No natural areas are converted to production.
- 8.6 A written conservation plan has been developed and is implemented.
- 8.7 Hunting, capturing, extracting and trafficking wild animals and plants are prohibited.

8.1.

AT LEAST 10% OF THE FARM AREA IS MAINTAINED IN ITS NATURAL STATE.

DESCRIPTION

A minimum of 10% of the farm is identified, restored and protected so that it is conducive to maintaining indigenous biodiversity.
These protected areas include:

- Areas unsuitable for agriculture.
- Areas identified as important habitats for rare/endangered species.
- Areas that provide ecosystem services to the greater area (e.g. rivers or natural corridors).

No harvesting of resources is permitted within this protected area; it is maintained free of alien species and is fenced and signed to deter intrusion by people.

In case of multiple protected areas, they are connected by corridors of native vegetation of no less than 1 m wide (can be a live fence line – see Practice 8.2).

Implementation Cost

Low cost.
Costs related to labor since there are few material costs.

Maintenence Cost

Low cost.
Costs related to monitoring and removal of invasive vegetation, occasional replacement of signage.

Benefits

Natural habitats provide a range of essential services for agriculture:

- Fungi and micro-organisms decompose organic matter, transferring nutrients to the soil.
- Ants and other insects control pest populations.
- Bees, butterflies, birds and bats pollinate fruit trees.
- Swamps and marshes filter out pollutants.
- Forests prevent flooding and reduce erosion.

Tips for implementation

The area to be set aside is identified by considering its biodiversity and agricultural value.
The area is demarcated on a map of the farm and a physical live fence (see Practice 8.2) is erected around it.

WHERE TO GET MORE INFORMATION

English:
https://www.cbd.int/agro/importance.shtml
http://www.wildfarmalliance.org/resources/BD%20Guide%20Organic%20Farmers%20.pdf.

8.2.

LIVE FENCING IS USED FOR BORDERS AND BOUNDARIES.

DESCRIPTION

All fence lines are composed of living plant material in the form of bushes and/or cropped trees, and are no less than 1 m in width. Other components, such as wood boards or wire, can be used in addition to the live component to create an impregnable barrier for humans and vehicles, but allow for the movement of small animals such as birds.

Implementation Cost

Medium to low cost (depending on plant material used).
Costs related to labor and fencing material

Maintenence Cost

Low cost.
Costs related to occasional pruning and replanting.

Benefits

Live fences provide essential habitat for indigenous species to live and breed. In turn, these species provide services, such as pollination and pest control, which are indispensable to the growth of mango trees and the production of fruit.
Living fences also provide shade, wind breaks, fuelwood, forage, soil nitrogen (if leguminous), reduced soil erosion and many other benefits that increase the productivity and value of the farm.

Tips for implementation

Preferably, indigenous species of woody plants are used to start the live fence. Other useful species can also be planted.
It is suggested to prune live fences to develop dense shrubbery from base to tip that function as an impregnable fence and good cover for species.

WHERE TO GET MORE INFORMATION

See local agricultural department.

8.3.

RIPARIAN HABITAT IS PROTECTED WITH A 5 M BUFFER ZONE.

DESCRIPTION

At least 5 m of natural vegetation surrounds all water bodies (rivers, ponds and lakes) on your farm. These barriers consist of permanent native vegetation including trees, bushes or other types of plants, in order to protect biodiversity, prevent erosion, minimize any negative visual impacts, and reduce the drift of agrochemicals, dust and other substances coming from agricultural or processing activities.

Implementation Cost

Low cost.
Costs related to some fencing where appropriate and vigilance.

Maintenence Cost

Low cost.
Costs related to occasional fencing upgrades (where appropriate).

Benefits

Natural buffers act as a filter for pollutants and debris running off the soil in heavy rains and help to maintain clean and healthy waterbodies.
Buffers allow soil to soak up more rainwater and will minimize the effects of flooding and prevent soil erosion.

Tips for implementation

Preferably, indigenous species of plants are used as the buffer. If there are livestock on the farm, buffer areas are fenced to deter animals entering the buffer and the waterbody.

WHERE TO GET MORE INFORMATION

See local agricultural department.

8.4.

SPECIFIC MEASURES ARE TAKEN TO PROTECT POLLINATORS AND OTHER BENEFICIAL SPECIES.

DESCRIPTION

Your farm encourages pollinators and other beneficial species to thrive on the property. Other beneficial species include insect-eating birds, earthworms that create soil and many others that sustain a healthy and balanced farm ecology.

This practice includes written farm policies that:

* Prohibit the use of chemicals that harm pollinators and beneficial species such as neonicotinoids.
* Prohibit the destruction of valuable habitat that beneficial species depend upon.
* Promote the minimization of all direct and indirect impacts that can occur through noise, use of vehicles and creation of roads, atmospheric pollution, etc.

Implementation Cost

Low to medium cost
Costs related to contracting local biologist (when needed).

Maintenence Cost

Low cost.
Costs related to occasional farm worker training and vigilance.

Benefits

There is a global decline in native pollinator species which is a concern for world agriculture in general. Pollinators such as bees and other insects are critical to farm productivity as fruit development is dependent on these species.
Maintaining beneficial species can increase productivity and avoid costs of artificial pollination or the use of commercial pollination services.

Tips for implementation

Create a list of beneficial species such as bees, birds and soil organisms, then create policies and procedures on how to minimize effects on them.
To maintain a healthy pollinator community on your farm, that includes both honey bees and native bees, it is important that your farm sets aside habitat for them as well as reduces the use of pesticides. Not only will this increase the productivity of your farm but also those of others too.

8.4.

SPECIFIC MEASURES ARE TAKEN TO PROTECT POLLINATORS AND OTHER BENEFICIAL SPECIES.

DECLINE OF BEES

Bees pollinated $20bn worth of crops in 2000 in North America, however despite their agricultural importance there has been a dramatic global population decline in both introduced and native species due to outbreaks of disease and their susceptibility to pesticides that are used on most commercial farms. This global decline concerns many entomologists, producers and governments, alike. For example, in response to this crisis, neonicotinoid pesticides, which have been linked to bee deaths, have already been prohibited by the European government to protect European farm production.

WHERE TO GET MORE INFORMATION

See local agricultural department or local university.

English:
Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms (Xerces Society) Informative guidelines outlining how to identify native bees and why they are important to farms. Information on providing and maintaining native bee habitats in agricultural settings. Includes various case studies.
http://www.xerces.org/wp-content/uploads/2008/11/farming_for_bees_guidelines_xerces_society.pdf.

Spanish:
http://www.fao.org/news/story/es/item/383741/icode/
http://consumidoresorganicos.org/ponte-abeja/

8.5.

NO NATURAL AREAS ARE CONVERTED TO PRODUCTION.

DESCRIPTION

All natural areas on your farm are maintained and no further conversion to production takes place.

Implementation Cost

Low cost.
Costs related to determining which areas are off limits to production and training of workers.

Maintenence Cost

No cost.

Benefits

This practice encourages producers to increase production in existing areas of cultivation and safeguard natural areas where beneficial plants and animals can exist. These areas provide benefits to the farm such as increased production and mitigation against extreme weather.

Tips for implementation

Develop a written zero-conversion policy that is both implemented and enforced. This policy prohibits the expansion of production agriculture into areas of natural vegetation.

WHERE TO GET MORE INFORMATION

See local agricultural department.

8.6.

A WRITTEN CONSERVATION PLAN HAS BEEN DEVELOPED AND IS IMPLEMENTED.

DESCRIPTION

Your farm's conservation plan includes:

- Maps of the farm that highlight natural areas, fence lines, and aquatic habitats.
- Lists of beneficial and endangered species.
- Policies that regulate how the farm protects biodiversity and implements habitat management.
- Information on how the conservation plan aligns with local and national policies on species protection.

Implementation Cost

Medium to high cost.
Costs are related to the development of a professional written plan. If producers wish to become accredited by a third party, costs will increase, however costs can be spread over years with accreditation (the costliest phase) occurring in the final year.

Maintenence Cost

Low cost.
Costs related to occasional updates to the plan.

Benefits

A conservation plan is often the basis for obtaining land use management certifications such as that of Rainforest Alliance. Obtaining certifications may increase access to markets.
A conservation plan also provides the foundation for employee training, adaptive management of biological resources, and ultimately a farm that uses biological resources wisely and sustainably.

Tips for implementation

It is recommended to first develop the plan among management and employees, then obtain professional input, and lastly obtain third party accreditation.
The conservation plan should ultimately be written by a professional and accredited by a third party, like Rainforest Alliance.

WHERE TO GET MORE INFORMATION

See your local agricultural department, your local university and Rainforest Alliance.

English:
http://www.wildfarmalliance.org/resources/BD%20Guide%20Organic%20Farmers%20.pdf.

Spanish:
http://infoagro.net/programas/ambiente/pages/agricultura/herramientas/1.pdf

8.7.

HUNTING, CAPTURING, EXTRACTING AND TRAFFICKING WILD ANIMALS AND PLANTS ARE PROHIBITED.

DESCRIPTION

A written policy document exists that prohibits removing wildlife (dead or alive) from your farm, unless there is a sound and legal reason for doing so that has the endorsement of the management, and the policy is enforced.

Implementation Cost

Low cost.
Costs related to developing policy document and training of workers

Maintenence Cost

No cost.

Benefits

Maintaining a healthy ecosystem on your farm is beneficial to farm productivity over the long term. To do this it is important to protect all native species that inhabit the farm. This practice aims to enhance the integrity of the ecology of the farm and in so doing increase production and value.

Tips for implementation

This policy document can be written without professional help.

9. WORKER COMPENSATION

WORKER COMPENSATION

An industry's workforce is the core of its productive output. Like any key resource, it should be managed in a way that promotes maximum efficiency and productivity. For this to occur, a sustainable industry respects the welfare and financial needs of its workforce by protecting them from potential harm and provides fair compensation for work undertaken at all levels of employment.

Globally, over 1 billion people work in agriculture, and more than 40% of that workforce are waged agricultural workers. Many of these agricultural workers are poorly paid and living below the poverty line and in conditions of food insecurity. The labor rights of farms workers, including issues such as working hours, social security benefits, minimum wage levels and the right to unionize, are often not respected. At the same time, the issues of social sustainability and worker equity are increasingly being addressed by consumer and human rights organizations.

The correlation between fair treatment of farm workers and food safety, product quality and productivity have also begun to be studied by certification bodies and worker organizations. Equitable treatment may also reduce the risk of labor shortages due to uncompetitive salaries and unfavorable labor conditions, and increase retention of skilled workers. From a sustainability perspective, it is important that agricultural production provide economic opportunities for all involved, including employers, workers, their families and local communities.

The following nine (9) practices are designed to help you ensure legal compliance, and foster positive relations with your workers by ensuring their well-being through adequate compensation and fair and transparent policies.

- 9.1. Minimum wage or greater is paid to all employees.
- 9.2. A living wage level has been established and is paid to employees.
- 9.3. Work based on production (quotas and piecework) is paid at least at a level proportionate to minimum wage.
- 9.4. Deductions from salaries are only permitted if stipulated by national laws and / or if written consent is given by the employee.
- 9.5. All overtime is voluntary, and paid at a premium.
- 9.6. Full-time employees and temporary workers employed for 3 months or more have a legally-binding contract.
- 9.7. Payments to workers are made at regularly scheduled intervals and documented with a pay slip.
- 9.8. Migrant, and seasonal/temporary workers are granted the same rights and benefits as permanent workers.
- 9.9. Workers are allowed at least one day of rest for every 6 consecutive days worked.

9.1.

MINIMUM WAGE OR GREATER IS PAID TO ALL EMPLOYEES.

DESCRIPTION

Nationally- or regionally-mandated minimum wage is paid to all employees whether full-time or seasonal workers. This level of minimum pay is maintained even when there are conditions that limit daily production, for example, inclement weather, lack of equipment, training sessions, or exclusion from certain work areas due to fumigation. The cost of housing, food or other services is not considered part of the payment of minimum wages.

Your farm pays workers in cash or another form easily converted into money, such as direct deposit or check from a local bank. Payment is not made in-kind or in a manner not easily negotiable, such as credit or vouchers.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to payment of minimum wage or greater to all employees.

Benefits

Payment of at least minimum wage can ensure that you are not subject to accusations of unfair payment of wages and, depending on national laws, may be a basic legal requirement. Minimum wages, as promoted by the International Labor Organization (ILO), are aimed at protecting workers who receive the lowest pay from "undue exploitation". (ILO, 2007) Worker well-being is directly linked to productivity and low turnover and benefits the company.

Tips for implementation

More information on national minimum wages may be found on the corresponding government websites of each country.

THE LIMIT OF MINIMUM WAGE

In many cases, the minimum level of compensation is not sufficient to ensure that workers and their families can meet basic living costs, including adequate food, housing, educational and other basic requirements.

Payment of wages above minimum wage (i.e. living wage) can help to ensure that workers can meet those basic needs and improve worker satisfaction leading to lower rates of turnover, and higher food quality and productivity. (See practice 9.2 for payment of a living wage).

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

9.2.

A LIVING WAGE LEVEL HAS BEEN ESTABLISHED AND IS PAID TO EMPLOYEES.

DESCRIPTION

The International Labour Organization (ILO) defines a living wage as a family wage, calculated based on take-home pay that ensures that workers and their families can live above the poverty level and participate in normal social and cultural activities. This sustainability practice involves first establishing a living wage level for your region and then ensuring this level of payment to all workers.

Implementation Cost

Variable cost. Costs related to the development of a living wage policy and the establishment of appropriate wage level.

Maintenence Cost

Variable cost. Will depend on the difference between current and living wage levels.

Benefits

Though you may see paying higher wages only as a cost to employers in the short term, better-paid employees can yield benefits. Decreased turnover, reduced sick leave, greater productivity and more motivated workers can result from a wage level that ensures well-being for workers and their families. Reputational risks are also reduced for employers when workers are paid a living wage.

Tips for implementation

Certain countries or regions have living wage levels developed by government or non-governmental organizations. You can consult these sources to establish a living wage in line with these guidelines. Alternatively, a living wage can be established for the local conditions, taking into account the methodological considerations outlined in the text box.

A LIVING WAGE LEVEL HAS BEEN ESTABLISHED AND IS PAID TO EMPLOYEES.

CALCULATING A LIVING WAGE

While there is no standardized methodology for calculating a living wage, it must be based on:

- Time- and place-specific data.
- The cost of a nutritious, low-cost diet.
- The cost of housing, clothing and footwear.
- Other costs such as transportation, children's education, healthcare, recreation, etc.

A recent ILO report stresses that the development of well-documented and defendable methodologies and estimates for living wages require resources and expertise, particularly in developing countries.

Fairtrade International commissioned several reports in recent years to determine living wages for agricultural workers in several countries, including the Dominican Republic and Brazil. The methodology employed has been supported by six sustainability standard systems.

In this joint effort, they define a living wage as: "Remuneration received for a standard work week by a worker in a particular place sufficient to afford an adequate standard of living for the worker and her or his family. Elements of a decent standard of living include food, water, housing, education, healthcare, transport, clothing, and other essential needs, including provision for unexpected events."

The methodology employed has two main components:
1. Estimate the cost of a basic but decent lifestyle for a worker and his/her family in the region.
2. Determine if this living wage is being paid.

The methodology includes estimating costs for food, housing, and other essential needs. Secondary data is used, but local data is also collected to determine the costs of food, decent housing, education, healthcare, and transportation. Worker input is obtained to determine realistic food prices, and national and international standards of decent housing are applied. Finally, the method excludes overtime pay from the determination of a living wage and indicates how the guidelines can be adjusted for temporary or seasonal workers.

For more on the methodology, see: http://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/GLWC_Anker_Methodology.pdf.

WHERE TO GET MORE INFORMATION

English:
http://www.ethicaltrade.org/issues/living-wage-workers/living-wage-resources
http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_162117.pdf
http://www.fairtrade.net/programmes/workers-rights.html#c9571
http://www.isealalliance.org/our-work/improving-effectiveness/global-living-wage-coalition

Spanish:
https://www.isealalliance.org/sites/default/files/LivingWageReportSpanish_DomRep.pdf
http://calculadorasalariodigno.trabajo.gob.ec/CalculadoraSalarioDigno/index.jsf

Portuguese:
http://www.isealalliance.org/sites/default/files/Living_Wage_Benchmark_Report_Brazil_Portuguese.pdf

9.3.

WORK BASED ON PRODUCTION (QUOTAS AND PIECEWORK) IS PAID AT LEAST AT A LEVEL PROPORTIONATE TO MINIMUM WAGE.

DESCRIPTION

If your farm uses a payment system based on production (quotas or piecework), a system is in place to ensure that workers earn at least the minimum wage based on a manageable work load during normal working hours and under normal working conditions. Information about this pay rate is transparent and available for all workers.

The system ensures that workers will earn a minimum wage without overtime hours, and that overtime hours are paid at the legally-mandated rate (see Practice 9.5).

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to fair payment of work based on production.

Benefits

Reputational risks can be avoided by ensuring that piecework systems do not lead to undue exploitation of the workforce. Unfair piecework payment systems can force workers to extend their working hours and/or involve workers' children in labor activities to ensure wages sufficient to meet basic needs. A fair and transparent system ensures both legal compliance and improved conditions of employment. Competitive piecework rates may also lead to increases in productivity and decreased turnover.

Tips for implementation

- Make information on the system of payment for piecework available to all workers and explain it clearly at the commencement of employment (during orientation), including the system for recording production and any productivity requirements.
- Information on piecework rates may be communicated to workers by some or all of the following methods:
  - Post information on notice boards or at kiosks.
  - Provide detailed information on pay slips.
  - Communicate with workers during regular meetings.
- Adjust piecework rates according to changing conditions in the orchard.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

9.4.

DEDUCTIONS FROM SALARIES ARE ONLY PERMITTED IF STIPULATED BY NATIONAL LAWS AND / OR IF WRITTEN CONSENT IS GIVEN BY THE EMPLOYEE.

DESCRIPTION

Your farm makes deductions from salary only as permitted by law. Any additional deductions are made with the written consent of the employee. You also ensure that deductions do not reduce wage levels below minimum wage, and are not employed as a form of financial disciplinary action.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the labor required to obtain written consent from workers for any deductions not stipulated by law.

Benefits

By implementing clear and fair policies on deductions, your farm can avoid reputational risks, and comply with any related legal requirements. Exploitive and unfair working conditions, when highlighted by the media or watchdog organizations, can result in loss of markets, as a result of consumer concerns.

Tips for implementation

* Develop policies on deductions from salaries, in accordance with this practice.
* Inform workers of all deductions from their salaries, and the procedures allowing them to appeal in the event of perceived discrepancies.
* Ensure deposits are not taken for basic work equipment, such as personal protective equipment, and that deposits are not required as a condition of employment.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

9.5.

ALL OVERTIME IS VOLUNTARY, AND PAID AT A PREMIUM.

DESCRIPTION

Your farm complies with national and local legislation and industry standards, and does not regularly require workers to work more than 48 hours per week or 10 hours per day. If workers accept overtime hours, they do not work more than 60 hours per week, except under exceptional circumstances.

All overtime is voluntary and workers are aware that they will be at no disadvantage in the event that they do not accept overtime hours. Overtime hours are recorded and paid at a premium, at least in accordance with national legislation.

Implementation Cost

No cost.

Maintenence Cost

Variable cost.
Costs related to appropriate payment of overtime hours.

Benefits

Proper implementation of this practice ensures that reputational risks are avoided and legal compliance is ensured. Also, it ensures that excess overtime hours do not lead to an increase in the accident rate at your farm.

Tips for implementation

- Develop a policy on overtime hours for your farm.
- Inform workers of your overtime policy when they are hired.
- Include information on payment of overtime in workers' pay slips (see Practice 9.7).
- Monitor health and safety statistics to ensure that overtime hours are not contributing to an increased accident rate.

DID YOU KNOW?

Due to the seasonality of mango production, more than 60 hours of work per week may be acceptable for short periods of time, while ensuring that workers have at least one day of rest for every 6 days of work (see Practice 9.9). Workers' hours should not exceed 60 hours per week averaged over an 8-week period, or as stipulated by national legislation.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

9.6.

FULL-TIME EMPLOYEES AND TEMPORARY WORKERS HAVE LEGALLY-BINDING CONTRACTS WITH YOUR FARM, IN ACCORDANCE WITH NATIONAL LEGISLATION.

DESCRIPTION

Your farm has written, legally-binding contracts with permanent and temporary workers, as required by national legislation. Workers receive copies of their written contracts.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to administration of contracts with employees.

Benefits

A written contract clearly defines the relationship between employer and workers, and can contribute to creating a positive working atmosphere, by establishing the rights and obligations of both parties. Appropriate contracts with workers can help farms avoid reputational risks related to unfair treatment of workers, and ensure legal compliance.

Tips for implementation

All worker contracts must be in accordance with local legislation. Legally-binding, written contracts should contain at least the following information:

- Job title and description.
- Working hours.
- Pay rate.
- Overtime regulations.
- Duration of employment.
- Social security benefits and deductions.
- Grievance procedures.
- Provisions on the termination of employment.

Alternatively, the contract may cover only basic information, such as position and wages, while additional information may be provided in a general document such as an employee handbook.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

9.7.

PAYMENTS TO WORKERS ARE MADE AT REGULARLY SCHEDULED INTERVALS AND DOCUMENTED WITH A PAY SLIP.

DESCRIPTION

Your farm pays all workers in full at regularly scheduled intervals, in accordance with the law, and documents the payments with a pay slip containing all necessary information, presented in a manner understandable to workers.

Implementation Cost

No cost.

Maintenence Cost

No cost.
Costs related to cover crop species planted (e.g., grasses, legumes, forbs or other herbaceous plants) and tillage systems.

Benefits

Regular pay and the provision of an understandable pay slip are key elements to ensure a fair and transparent pay system. This leads to employee trust and dependable worker productivity.

Tips for implementation

- Clearly communicate the pay schedule and pay policies to all workers.
- Make payment directly to workers in legal tender (cash, check or direct deposit).
- Provide a pay slip with each payment, that clearly informs wages earned, bonuses, overtime payment, and a detailed list of deductions.
- Develop an appeal mechanism to address any perceived discrepancies in payment detected by workers.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

9.8.

MIGRANT, AND SEASONAL/TEMPORARY WORKERS ARE GRANTED THE SAME RIGHTS AND BENEFITS AS PERMANENT WORKERS.

DESCRIPTION

Migrant and seasonal/temporary workers receive the same rights, benefits and employment conditions as local and permanent workers, and equal wages for the same work performed. Where migrant and/or temporary/seasonal workers cannot receive the same benefits (e.g. pension schemes or social security), equivalent benefits are provided through alternative means.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the payment of equivalent benefits for all workers.

Benefits

Migrant, seasonal and temporary workers are often disadvantaged in terms of wages, housing and medical coverage. Developing and implementing specific policies can help ensure that your farm avoids reputational risks related to exploitation of this type of worker, and safeguards the well-being of this important sector of the agricultural workforce.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

English:
http://www.iufdocuments.org/www/documents/migrantcharter-e.pdf

Spanish:
http://www.iufdocuments.org/www/documents/migrantcharter-es.pdf

9.9.

WORKERS ARE ALLOWED AT LEAST ONE DAY OF REST FOR EVERY SIX CONSECUTIVE DAYS WORKED.

DESCRIPTION

Your farm allows workers 24 consecutive hours of rest for every 6 consecutive days worked (unless exceptional circumstances apply). Exceptional circumstances may include peak periods of production or changing weather conditions.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Respecting days off is a requirement of national legislation in many countries and is an industry best practice. It will also contribute to maintaining worker trust and productivity.

Tips for implementation

In the event of exceptional circumstances, they must be agreed upon in writing by all workers, indicating the period for which they are applicable.
Offer the rest days lost during the period of exceptional circumstances to workers at the end of this period.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

10. WORKER HEALTH & SAFETY

WORKER HEALTH & SAFETY

Agricultural workers are at the base of the food production system. They are also at the frontlines in efforts to ensure efficient operations, food safety, and environmental protection. At the same time, agriculture is considered one of the three most hazardous industries, together with construction and mining, due to the high numbers of workers killed, injured or made ill due to their work. The health risks result from the physically demanding nature of much agricultural work, as well as factors such as the exposure to the elements, use of synthetic pesticides, and work done at heights. Such factors are often exacerbated by poorly-designed tools and use of sophisticated machinery and agrochemicals, in the absence of adequate training and appropriate safety measures. Levels of poverty among waged agricultural workers also mean that health risks may be heightened. due to poor diet and malnutrition. Ensuring access to medical care for agricultural workers is of particular importance given not only the inherent dangers of the work but also the often remote locations of farms

Adequate health and safety in the workplace are directly related to food quality and safety, as well as public health and the environmental impact of the operations. Well-trained employees, implementing adequate health and safety procedures, can also reduce the risks of negative impacts from the operations that could affect the local environment and compromise food safety. Education and training of workers are key to making progress towards sustainable operations, as is providing workers with adequate equipment and procedures to maintain safe operations.

Implementing the following eleven (11) practices will help you ensure worker health and safety on your farm:

- 10.1. Legally-mandated social security is provided for all employees.
- 10.2. Access to appropriate medical services is ensured in the event of work-related illness or injury.
- 10.3. Standard Operating Procedures (SOPs) exist for workplace safety and accident prevention.
- 10.4. At least one employee health and safety training meeting is conducted at the beginning of the season.
- 10.5. Employees working with chemicals or carrying out other hazardous work are provided with appropriate Personal Protective Equipment (PPE).
- 10.6. Training is regularly provided to all employees handling agrochemicals.
- 10.7. Safety statistics are tracked and analyzed.
- 10.8 Regular medical testing is provided to workers handling agrochemicals.
- 10.9 All information regarding hazardous work is clearly displayed in the workplace, and re-entry intervals are adhered to after pesticide applications.
- 10.10. All employees are provided with access to clean drinking water, clean toilets and handwashing facilities.
- 10.11. Employees are provided with suitable areas where they can rest.

10.1.

LEGALLY-MANDATED SOCIAL SECURITY IS PROVIDED FOR ALL EMPLOYEES.

DESCRIPTION

Your farm complies with all legal obligations to provide health insurance and/or social security benefits to all workers. Where these benefits are not available for temporary or migrant workers, your farm ensures their access to comparable health services.

Implementation Cost

No cost.

Maintenence Cost

Variable cost. Costs related to the payment of legally-mandated health insurance and/or social security benefits.

Benefits

Providing legally-mandated worker benefits not only ensures compliance, but also protects your farm against reputational risks related to unfair treatment of workers. Proper health insurance and social security benefits are also a basic requirement to ensure the well-being of the workforce, and may improve relations with workers, leading to fewer days off and higher levels of productivity.

WHERE TO GET MORE INFORMATION

Contact local labor authorities for further information.

10.2.

ACCESS TO APPROPRIATE MEDICAL SERVICES IS ENSURED IN THE EVENT OF WORK-RELATED ILLNESS OR INJURY.

DESCRIPTION

Your farm ensures all workers have access to appropriate medical services during working hours in case of workplace injuries or illnesses. If the farm is located far from a clinic, hospital or population center, transportation is provided for workers to access medical services or these services are provided by an on-site doctor or nurse.

Implementation Cost

Variable cost.
Costs related to developing the policy, first aid facilities and, where applicable, hiring medical staff.

Maintenence Cost

Variable cost.
Costs related to provision of healthcare services, which may be covered by government health insurance or social security.

Benefits

Given the dangerous nature of agricultural work, and the often remote locations of farms, providing access to medical services is an important obligation of agricultural employers. In addition to safeguarding worker health and safety, this may be a basic legal requirement.

Tips for implementation

- Determine whether workers have access to these services through government healthcare coverage or as a result of legally-mandated health insurance or social security benefits.
- Where required, farms may be legally obligated to contract on-site medical services.
- In addition to ensuring access to medical services, it is good practice for farms to provide first aid facilities, equipment and trained first aid staff to meet all reasonably foreseeable emergency first aid situations.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

10.3.

STANDARD OPERATING PROCEDURES (SOPS) EXIST FOR WORKPLACE SAFETY AND ACCIDENT PREVENTION.

DESCRIPTION

Production-related risks have been identified for your farm, and procedures have been developed to minimize or eliminate occupational risks for workers. Procedures are implemented systematically to ensure benefits in terms of accident-reduction.

Implementation Cost

Variable cost. Costs related to hiring of external consultant to assist in developing procedures and reviewing legal compliance (if required).

Maintenence Cost

No cost.

Benefits

Identifying risks and developing procedures that minimize the risk of accidents and injuries will improve worker health and the safety of company operations. This will reduce healthcare costs, lost time, and possible impacts on neighbors and local communities resulting from inappropriate practices on your farm.

Tips for implementation

- Develop procedures and review to ensure compliance with national laws.
- Identify potential emergencies, and develop response plans so that impacts on workers and the community are minimized.
- Train workers on SOPs and maintain communication on this topic.
- Involve workers in reviewing procedures, and designate one employee to ensure compliance with procedures.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

10.4.

LEAST ONE EMPLOYEE HEALTH AND SAFETY TRAINING MEETING IS CONDUCTED AT THE BEGINNING OF THE SEASON.

DESCRIPTION

Your farm regularly trains workers on occupational health and safety, relevant health protection, and first aid, at least once a year at the beginning of the season. Any newly hired or reassigned workers also receive this training. Records of training are kept, and appropriate educational materials are used (videos, manuals, diagrams, etc.).

Implementation Cost

Medium cost.
Costs related to the development of appropriate training materials and lesson plans.

Maintenence Cost

Low cost.
Costs related to instructor wages and maintaining records of training.

Benefits

Adequate health and safety training is an important area of risk management for any farm. Promoting safe work practices through regular and appropriate training can reduce the accident rate by avoiding injuries and illnesses, and minimizing healthcare costs and the number of lost days. It is a prerequisite to ensuring worker well-being, and properly trained workers will also be more productive.

Tips for implementation

- Topics covered by health and safety training will likely include:
  - Operating machinery and using tools.
  - Handling and disposal of chemicals.
  - First aid and safety.
  - Housekeeping.
  - Personal protective equipment.
- Maintain records of training sessions, including the topic, duration, materials used, trainer and workers in attendance.
- Make workers aware they have the right to remove themselves from any unsafe situation without being penalized.
- It is best practice to designate a member of the farm administration responsible for health and safety.

WHERE TO GET MORE INFORMATION

English:
https://www.osha.gov/dsg/topics/agriculturaloperations/generalresources.html
https://www.cdc.gov/niosh/topics/aginjury/

Spanish:
https://www.cdc.gov/spanish/niosh/topics/agriculture.html
http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_117460.pdf

10.5.

EMPLOYEES WORKING WITH CHEMICALS OR CARRYING OUT OTHER HAZARDOUS WORK ARE PROVIDED WITH APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE).

DESCRIPTION

Your farm provides all workers handling chemicals and/or carrying out any other hazardous work with appropriate personal protective equipment (PPE) in good condition and free of charge. Workers are instructed and monitored in the proper use of PPE.

Implementation Cost

Medium cost.
Costs related to purchasing required PPE.

Maintenence Cost

Medium cost.
Costs related to the maintenance of PPE and replacements of filters, etc.

Benefits

Adequate PPE is necessary to protect worker health and safety when handling hazardous materials, particularly agrochemicals. When properly used and maintained, together with adequate safety training (see Practices 10.4 and 10.6), PPE can help farms avoid accidents and illnesses related to the handling and application of agrochemicals, and the carrying out of other hazardous activities.

10.5.

EMPLOYEES WORKING WITH CHEMICALS OR CARRYING OUT OTHER HAZARDOUS WORK ARE PROVIDED WITH APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE).

Tips for implementation

The following list of questions can help you determine the PPE required on your farm and guide its proper use:

- **What are the hazards?** Identify all potential hazards and determine the PPE required for each. These will likely include handling agrochemicals and other hazardous materials (fertilizers, solvents, etc.), as well as other hazardous activities related to lifting and/or operating heavy equipment, work at heights, etc.
- **What is the appropriate PPE for each type of hazard?** For agrochemicals, appropriate PPE may be listed on the label, in the material safety data sheet, or in related legislation. The necessary PPE may include: rubber boots or other appropriate footwear, waterproof clothing, protective overalls, rubber gloves, face masks, appropriate respiratory equipment (including replacement filters), and ear and eye protection devices.
- **Are mechanisms in place to ensure that PPE is properly used at all times?** Provide training and incentives to ensure workers use PPE whenever handling agrochemicals or undertaking other hazardous activities (see Practice 10.6). Monitor use of PPE by workers.
- **Is PPE appropriately cleaned and stored?** Ensure workers clean and store PPE onsite, and that workers never take it home. Store clean PPE in a location separate from agrochemicals and other hazardous materials. Provide the workers responsible for cleaning contaminated PPE with appropriate protective equipment.
- **Is PPE properly maintained and renewed?** Inspect PPE regularly, and repair or replace damaged or worn out equipment. For agrochemical handlers, it is recommended that PPE be inspected at the beginning of each day of application. Replace face masks and respirator filters or cartridges in accordance with product guidelines.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

English:
http://www.agrisafe.org/ppe-training
http://www.wyomingextension.org/agpubs/pubs/B1233.pdf
http://extension.psu.edu/business/ag-safety/health
FAO Guidelines on Good Practice for Ground Application of Pesticides
http://www.fao.org/docrep/006/Y2767E/Y2767E00.HTM

Spanish:
http://edis.ifas.ufl.edu/pi243
Guías sobre Buenas Prácticas para la Aplicación Terrestre de Plaguicidas de la FAO
http://www.fao.org/docrep/006/Y2767S/Y2767S00.HTM

10.6.

TRAINING IS REGULARLY PROVIDED TO ALL EMPLOYEES HANDLING AGROCHEMICALS.

DESCRIPTION

Your farm trains all workers who handle agrochemicals at least once a year. The training covers the health and environmental risks of the products used on your farm, and enables workers to take correct emergency actions in case of an accident. A qualified instructor (in-house or external) with appropriate knowledge and experience carries out the training.

Implementation Cost

Medium cost.
Costs related to developing appropriate training materials and lesson plans.

Maintenence Cost

Low cost.
Costs related to instructor wages and maintaining records of training.

Benefits

Chronic exposure to hazardous pesticides can result in serious illness. Globally, an estimated 20,000 deaths occur each year as a result of unintentional pesticide poisonings. Proper training will ensure workers prevent exposure to pesticides and act to minimize the effects if exposure occurs. For employers, the benefits of such training include a reduction in pesticide-related accidents that could result in lost time, healthcare costs, and possible legal action.

DID YOU KNOW?

Workers who handle pesticides include all those who carry out any of the following activities:

- Mixing, loading, transferring, and applying agrochemicals, including by means of chemigation (through drip irrigation system).
- Incorporating pesticides into the soil through mechanical means or by watering-in.
- Maintaining, servicing, repairing, cleaning, or handling equipment used in pesticide application.
- Working with open pesticide containers.
- Entering a treated area during application or during the restricted entry interval.

10.6.

TRAINING IS REGULARLY PROVIDED TO ALL EMPLOYEES HANDLING AGROCHEMICALS.

Tips for implementation

- Train all workers who handle agrochemicals on at least the following topics:
  - Interpretation of pesticide product labels and Material Safety Data Sheets (MSDS): format, formulations, and precautionary statements on human health.
  - Hazards of pesticides (acute, chronic, delayed, and sensitization effects).
  - Correct use and maintenance of personal protective equipment (PPE) (see Practice 10.5).
  - Pesticide safety requirements and procedures for handling, transporting, storing, and disposing of pesticides (see Practices 6.3 and 6.4).
  - Preventative measures and steps to reduce damage to health and the environment caused by chemical substances: equipment, techniques, signage, medical examinations, etc.
  - Routes by which pesticides can enter the body (ingestion, inhalation, absorption through skin or eyes).
  - Emergency procedures, first aid and medical attention for cases involving poisoning or undue contact with chemical substances.
  - Environmental hazards (drift, runoff and wildlife hazards).
  - Secure handling and transportation of agrochemicals for drivers.
- Maintain records of all training sessions, including the name of the trainer, workers in attendance, topics covered, materials used, and duration.

WHERE TO GET MORE INFORMATION

English:
https://www.epa.gov/pesticide-worker-safety/safety-training-pesticide-workers-and-handlers
http://oehha.ca.gov/pesticides/education-and-training
http://www.cdpr.ca.gov/docs/enforce/cmpliast/handling_pesticides.pdf

Spanish:
https://www.epa.gov/sites/production/files/2015-06/documents/protectyourselffrompesticidesspanish_735_b_06_001.pdf
http://www.fao.org/docrep/006/Y2767S/Y2767S00.HTM
http://www.bvsde.paho.org/foro_hispano/Unidad_9.htm

10.7.

SAFETY STATISTICS ARE TRACKED AND ANALYZED.

DESCRIPTION

Written records are kept of all occupational injuries, illnesses, and deaths. Based on these records, safety statistics are analyzed, and corrective actions are taken when issues are detected.

Implementation Cost

Low cost.
Costs related to the creation of tracking tool in easy-to-use format (such as Excel).

Maintenence Cost

Low cost.
Costs related to maintaining records of accidents and days lost.

Benefits

Maintaining records of work-related accidents and illnesses will assist your farm to set safety goals and track success. Detailed records may also help to identify problem areas, and implement corrective actions to ensure greater worker health and safety.

Tips for implementation

- Designate a member of the medical staff (nurse, doctor) or another employee to keep records of workers' illnesses, accidents, first aid healthcare and other healthcare provided, as well as days lost.
- Analyze the resulting safety statistics regularly to detect trends and set targets for accident reduction.
- It is best practice to take corrective action when hazardous areas or procedures are detected through the analysis of safety statistics.

SAFETY STATISTICS TOOL

Date of incident	Name of employee	Reason/explanation of incident	# days lost	First aid

10.8.

REGULAR MEDICAL TESTING IS PROVIDED TO WORKERS HANDLING AGROCHEMICALS.

DESCRIPTION

Your farm has identified all workers who handle agrochemicals and therefore require related medical testing. Medical testing is carried out before the individual worker is exposed, to determine the worker's baseline health information, and follow-up tests are carried out according to the type and toxicity classification of the pesticides being handled. Appropriate follow-up medical tests are carried out at least once per year.

If organophosphates or carbamates are used on your farm, follow-up tests are carried out every 6 months OR as stipulated by law (whichever is more frequent).

Implementation Cost

No cost.

Maintenence Cost

Medium cost.
Costs related to payment for medical tests.

Benefits

Prolonged exposure to agrochemicals, especially certain highly toxic formulations, can cause permanent health damage to handlers. In addition to proper safety training and equipment, medical testing is an essential requirement to ensure the protection of the long-term health of agrochemical handlers and is also a legal requirement.

Tips for implementation

Implementation of the medical testing involves:

- Identification of the workers in contact with agrochemicals and who require testing.
- Before exposure, completion of medical tests for cholinesterase inhibition, and any other tests required to determine potential effects of exposure to agrochemicals, to establish the baseline health information for each worker identified.
- Review of pesticide application equipment and personal protective equipment, if medical results indicate health impacts of pesticide exposure (such as cholinesterase inhibition), to determine why exposure is occurring.
- Reassigning workers from pesticide handling, if medical tests identify health impacts, in accordance with physician's instructions.
- Maintaining resulting medical records for three years, and providing access to workers to their medical records at any time.

WHERE TO GET MORE INFORMATION

English:
https://www.epa.gov/pesticide-worker-safety
http://oehha.ca.gov/pesticides/education-and-training
https://www.osha.gov/dte/grant_materials/fy11/sh-22284-11/CholinesteraseHealthcareProviders.pdf
http://www.cdpr.ca.gov/docs/whs/pdf/hs8.pdf
http://nasdonline.org/1904/d001861/acetylcholinesterase-che-testing-for-handlers.html
http://www.ehs.ufl.edu/programs/ih/pesticide/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4224972/

Spanish:
http://www.bvsde.paho.org/foro_hispano/Unidad_9.htm
http://asinom.stps.gob.mx:8145/upload/noms/Nom-003.pdf

10.9.

ALL INFORMATION REGARDING HAZARDOUS WORK IS CLEARLY DISPLAYED IN THE WORKPLACE, AND RE-ENTRY INTERVALS ARE ADHERED TO AFTER PESTICIDE APPLICATIONS.

DESCRIPTION

Safety instructions for hazardous work are clearly displayed in the workplace, through signs in the language(s) understood by workers and with pictures.

After pesticide applications, re-entry intervals are adhered to and access to those areas is not permitted and marked by warning signs with symbols.

Implementation Cost

Low cost.
Costs related to the creation of safety instructions and signage.

Maintenence Cost

Low cost.
Costs related to the maintenance of signage and enforcement of restricted entry intervals (REIs).

Benefits

Health and safety risks related to pesticide application and other hazardous work can be reduced through worker training, information, and appropriate procedures. Maintaining restricted entry intervals following pesticide application is one important step in reducing these risks. Training and visible signage, using symbols and/or pictures, will help ensure workers are informed of hazards and related safety procedures.

Tips for implementation

- Identify hazardous activities and develop signage with symbols and/or pictures to communicate safety instructions.
- Train workers on safety instructions and hygiene recommendations (see Practices 10.4 and 10.6).
- Develop procedures indicating who oversees informing and monitoring adherence to safety instructions.

10.9.

ALL INFORMATION REGARDING HAZARDOUS WORK IS CLEARLY DISPLAYED IN THE WORKPLACE, AND RE-ENTRY INTERVALS ARE ADHERED TO AFTER PESTICIDE APPLICATIONS.

RESTRICTED ENTRY INTERVALS

Restricted entry intervals following pesticide application are indicated on product labels or the related Material Safety Data Sheet. Implementation of restricted entry intervals (REIs) and other safety instructions will involve the following:

- Determine the REI for each product applied on your farm.
- Train workers on the implementation and importance of restricted entry intervals following pesticide applications, and the use of warning signs.
- Develop procedures indicating who is in charge of informing and monitoring adherence to restricted entry intervals, including the use of warning signs with symbols.

If a pesticide label and Material Safety Data Sheet do not indicate the restricted entry interval required after application, apply the following guidelines for each World Health Organization (WHO) acute toxicity category:

- WHO Categories III and IV – between 4 and 12 hours.
- WHO Category II products – between 24 and 48 hours.
- WHO Category I products – between 48 and 72 hours.

At all times, restrict access for the full re-entry interval and at least until the foliage is dry.

WHERE TO GET MORE INFORMATION

English:
https://www.epa.gov/pesticide-worker-safety/restrictions-protect-workers-after-pesticide-applications
http://www.cdpr.ca.gov/docs/enforce/bulletins/rei_doc.pdf

Spanish:
http://publicaciones.ops.org.ar/publicaciones/saludAmbiental/Plaguicidas.pdf

10.10.

ALL EMPLOYEES ARE PROVIDED WITH ACCESS TO CLEAN DRINKING WATER, CLEAN TOILETS AND HAND-WASHING FACILITIES.

DESCRIPTION

Access to clean, safe drinking water that complies with national standards is provided to all workers. Your farm has enough toilets, they are maintained clean, and toilet paper is provided and disposed of properly.

Employees are instructed to wash their hands before handling mangos or entering the work area, as well as after eating, using toilets or taking a break, or anytime when hands have potentially been contaminated.

Implementation Cost

Variable cost.
Costs related to possible upgrading or new construction of toilets and hand-washing facilities.

Maintenence Cost

Low cost.
Costs related to the provision of drinking water and maintenance of facilities.

Benefits

Due to the strenuous nature of agricultural work, especially in tropical climates, there are risks of heat-related illness (heat exhaustion and heat stroke). Proper hydration is one of the key factors in the prevention of heat-related illness. A joint EPA/OSHA guide on heat stress in agriculture emphasizes that workers with mild effects of heat illness are more likely to have accidents and use poor judgment, while indicating that people work slower and less efficiently when they are under too much strain from heat. Access to clean water will reduce the risk of heat-related illness and help your farm maintain worker productivity.

Urination or defecation outdoors or in the orchards represents a potential source of contamination. As well as being a basic requirement for employees, clean toilets and hand-washing facilities are essential to food safety, particularly for the prevention of biological contaminants.

Tips for implementation

- Use visible signage to remind employees to wash their hands before handling mangos or entering work areas.
- Adequate hand-washing facilities for workers require running water, soap, and paper towels. Hand sanitizer may also be provided.

WHERE TO GET MORE INFORMATION

English:
http://mangofoodsafety.org/
https://www.osha.gov/SLTC/heatillness/index.html
https://www.epa.gov/pesticide-worker-safety/preventing-heat-stress-agriculture

Spanish:
http://mangofoodsafety.org/spanish.html
https://www.osha.gov/SLTC/heatillness/

10.11.

EMPLOYEES ARE PROVIDED WITH SUITABLE AREAS WHERE THEY CAN REST.

DESCRIPTION

Your farm provides workers with suitable, shaded areas where they can rest during breaks and meal times. A canteen with cooking facilities is provided if requested by workers. Rest areas and canteens are maintained clean at all times.

Implementation Cost

Variable cost.
May require building or adapting areas on your farm.

Maintenence Cost

Low cost.
Costs related to general maintenance and cleaning.

Benefits

Shaded rest areas are important for agricultural workers to avoid heat-related illness, especially during periods of high heat. By providing workers with rest areas where personal items can be stored, as well as canteens where applicable, farms can avoid contamination of mangos by workers' food or personal items, thus ensuring food safety.

Tips for implementation

- Provide a clean area where workers can leave their personal items.
- Canteens may not be necessary or appropriate for small farms.
- When provided, ensure canteens have clean and adequate cooking facilities.

11. OTHER WORKER BENEFITS

OTHER WORKER BENEFITS

Fair treatment of workers is a basic principle of sustainable operations. Fostering good relations with workers, enhancing productivity, decreasing turnover, and minimizing reputational risks are some of the benefits of adopting this principle.

Issues related to the fair treatment of workers represent both a significant area of risk as well as an opportunity. On the risk side, media and non-governmental organizations in the United States and Europe have called attention to the treatment of farm workers in Mexico and Central and South America. Several recent reports have focused on the production of tropical fruits, including mangos, highlighting issues such as child labor, poor housing, and violations of worker rights in general. In extreme cases, the unfair treatment of farm workers has been compared to a form of modern-day slavery. Migrant and indigenous farm workers are groups of special concern that often have less access to systems of redress.

Customer and consumer perception of labor management can lead to product boycotts. A recent report published by SEDEX Global, highlighted such a risk, identifying labor management as one of the major risks for Latin America's supply chains, together with the ability for companies to ensure that internal systems are in place to meet local and international compliance standards for labor.

When effective and properly documented systems are in place, the rights and fair treatment of workers can be guaranteed. In addition, they can help you gain access to certifications and product streams that pay a premium price, such as fair trade.

The following eight (8) practices are designed to ensure labor rights are respected and workers are treated with dignity.

- 11.1. If housing for permanent or temporary workers is provided, it is well-designed and maintained to foster good health and safety conditions.
- 11.2. An orientation program is provided for new employees.
- 11.3. A "non-discrimination policy" has been established and is enforced.
- 11.4. A grievance procedure has been established and is effectively implemented.
- 11.5. Lunch and rest breaks are granted and respected.
- 11.6. A minimum age policy has been established and is enforced.
- 11.7. Workers' freedom of association and their right to organize are recognized.
- 11.8. All employment is freely chosen.

11.1.

IF HOUSING FOR PERMANENT OR TEMPORARY WORKERS IS PROVIDED, IT IS WELL-DESIGNED AND MAINTAINED TO FOSTER GOOD HEALTH AND SAFETY CONDITIONS.

DESCRIPTION

If your farm provides housing for permanent, migrant or other temporary workers, the housing and community facilities are well-designed (see below), built, maintained and improved to ensure good hygienic, health and safety conditions, and a decent living environment.

Workers are granted the freedom to choose whether they want to live in the housing you provide.

Implementation Cost

Variable cost.
Costs related to possible investment in upgrading of housing.

Maintenence Cost

Medium cost.
Costs related to maintenance of housing and community facilities.

Benefits

Studies of agricultural workers by the International Labour Organization (ILO) note the close link between worker housing, well-being and productivity. Poor housing conditions can lead to the spread of communicable diseases, and inadequate sanitary conditions can expose workers to waterborne diseases. If worker well-being is supported through access to basic sanitation and hygiene, workers are also more likely to maximize productivity while ensuring food safety.

IF HOUSING FOR PERMANENT OR TEMPORARY WORKERS IS PROVIDED, IT IS WELL-DESIGNED AND MAINTAINED TO FOSTER GOOD HEALTH AND SAFETY CONDITIONS.

Tips for implementation

According to ILO Recommendation 115 on worker housing, employer-provided housing should ensure, "structural safety and reasonable levels of decency, hygiene and comfort." To this end, the following are some of the key characteristics required for the housing:

- Compliance with national and regional legislation.
- Sufficient space and clean, sanitary mattresses.
- Adequate natural light during the day and sufficient artificial lighting.
- Proper ventilation in all weather conditions.
- Adequate supply of safe potable water.
- Sufficient and hygienic sanitary facilities. Where communal, provision of separate sanitary facilities for men and women.
- Adequate drainage.
- Sufficient laundry facilities.
- Regular inspection and upkeep of housing and community facilities.
- Fire safety measures and safe electrical installations.

ILO guidelines set out the following additional recommendations for employer-provided housing:

- Housing is provided only in cases where the work site is distant from population centers or where working conditions require workers to be available at short notice.
- Where possible, the ILO recommends assisting workers to find housing independently, to increase their integration with local communities and reduce dependence on the employer.
- If rent is charged, it is in accordance with local averages and does not exceed a reasonable proportion of worker income.
- Workers have the right to invite guests to their employer-provided housing.
- Workers have access to public and private transportation facilities, and are within easy reach of places of employment, and in close proximity to community facilities, such as schools, recreation areas, and medical services.

WHERE TO GET MORE INFORMATION

English:
http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_116344.pdf

Spanish:
http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_142785.pdf

11.2.

AN ORIENTATION PROGRAM IS PROVIDED FOR NEW EMPLOYEES.

DESCRIPTION

Your farm provides an orientation program for new employees that includes a manual of company policies, job expectations, and terms of employment. These documents may be contained in an employee handbook. The orientation program includes an overview of the company's operations and sustainability policies and practices.

Implementation Cost

Low cost.
Costs related to the design of the orientation program and related materials.

Maintenence Cost

Low cost.
Costs related to the time dedicated to implementation of orientation program.

Benefits

Orientation for new workers will help them to become more comfortable in the workplace and may, therefore, lead to earlier and higher productivity. A written orientation plan will increase efficiency and ensure all new workers receive the same information.

Tips for implementation

It is common for new employee orientation programs to include some or all of the content listed below.

- Review of company mission, vision, and values.
- Review of company work standards and discipline issues (e.g., tardiness, dress, timekeeping procedures).
- Overview of wages and benefits.
- Review of specific company policies (e.g., non-discrimination policy, overtime policies, etc.).
- Review of company sustainability policies and procedures.
- Signing required documents (e.g. employment contract, receipt of employee handbook, etc.).

Note: Employee orientation should occur ideally on the first day of work or at least within the first week of employment.

WHERE TO GET MORE INFORMATION

English:
https://www.extension.iastate.edu/AgDM/wholefarm/html/c1-78.html

11.3.

A NON-DISCRIMINATION POLICY HAS BEEN ESTABLISHED AND IS ENFORCED.

DESCRIPTION

Your farm has established and implemented a written policy prohibiting discrimination in hiring, promotions, access to training, compensation, allocation of work, termination of employment, or treatment of employees in the workplace generally, along the lines of race, color, gender, age, religion, social class, political tendencies, nationality, syndicate membership, sexual orientation, marital status or any other motive. This policy is effectively communicated to all employees, who receive training on its implementation.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the training of managers and workers.

Benefits

A workplace non-discrimination policy, while establishing the basis for equitable treatment, ensures that your farm complies with relevant national legislation, and reduces liability related to claims of discrimination from workers or clients. Related reputational risks may also be averted with a properly elaborated and implemented policy.

Tips for implementation

Development and implementation of the non-discrimination policy includes:

- Review of relevant national legislation to ensure compliance.
- Development of policies and procedures to ensure equal treatment in hiring, promotions, access to training, compensation, allocation of work, and termination of employment. The policy should also include zero tolerance for sexual harassment in the workplace, applicable to both management and workers.
- Training of managers, supervisors and/or workers on the principles of non-discrimination, and the promotion of a harassment-free workplace.
- Presentation of the policy as part of the orientation program.
- Awareness training for all workers on non-discrimination and sexual harassment.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

English:
http://www.equitablefood.org/single-post/2016/03/28/A-harassmentfree-workplace-is-a-human-right

11.4.

A GRIEVANCE PROCEDURE HAS BEEN ESTABLISHED AND IS EFFECTIVELY IMPLEMENTED.

DESCRIPTION

A written grievance policy, and related procedures, determines how workers' grievances and concerns are handled on your farm.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the resolution of grievances presented by employees.

Benefits

A grievance procedure not only ensures compliance with national legislation, but may also allow companies to save time and money by identifying and resolving workplace issues, and building an atmosphere of openness and trust. Addressing worker concerns in a fair and timely manner can also increase worker satisfaction.

Tips for implementation

Implementation of a grievance policy will likely include:

- Designating a person responsible for handling worker grievances.
- Making all employees aware of the policy and procedures upon hiring.
- Investigating issues raised via the grievance procedure and communicating the results to the worker who presented the concern.
- Ensuring that repercussions are not taken against workers who report grievances, and where possible, that the identity of the worker is protected.

Grievances may be reported directly or anonymously. Options for allowing workers to report grievances anonymously include:

- A suggestion box.
- An anonymous phone line.

Farms can also encourage worker feedback, for example, by scheduling meetings with workers to discuss their concerns.

11.5.

LUNCH AND REST BREAKS ARE GRANTED AND RESPECTED.

DESCRIPTION

Your farm ensures workers receive a 30-minute paid lunch break, as well as 15-minute paid rest breaks for every four hours worked, or as specified in national legislation.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Regular breaks are associated with reduced stress, and increased productivity, especially given the strenuous nature of much agricultural work. Lunch and rest breaks are also mandated by law in many countries.

Tips for implementation

To ensure proper implementation of lunch and rest break policies:

- Inform all workers they are entitled to these breaks.
- Where workers are paid by quota or piecework, ensure the quotas allow sufficient time for workers to reasonably take rest breaks.
- It is best practice to allow rest breaks to be spread out through the day.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

11.6.

A MINIMUM AGE POLICY HAS BEEN ESTABLISHED AND IS ENFORCED.

DESCRIPTION

Your farm has a written minimum age policy prohibiting children under 15 years of age from working on the farm, and has procedures to ensure that children under 18 years do not engage in any type of hazardous work.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Given that agriculture is one of the three most hazardous sectors for workers, it is important that children be protected from health and safety risks. It is also important that children's education not be hindered. Developing and implementing a clear minimum age policy will ensure your farm complies with national legislation and international standards, and will help avoid the risk of reputation damage for exploitative child labor.

Tips for implementation

- Develop a written policy to ensure that child workers are not employed on the farm. This covers workers under 15 years of age.
- Communicate the policy to all workers during orientation.
- If child workers are currently employed on the farm, develop a responsible procedure to phase-out child labor as soon as possible.
- Develop a system to check the age of all workers on the farm, especially on hiring, and maintain records with appropriate documentation.
- Ensure that all local legal requirements are met for workers under 18 years, particularly:
  - Workers under 18 are prohibited from undertaking hazardous work (e.g., handling agrochemicals, work at dangerous heights or operating machinery) and working at night.
- Develop mechanisms to ensure that school-aged children living on the farm have access to education.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

English:
http://www.ilo.org/ipec/areas/Agriculture/lang--en/index.htm

Spanish:
http://www.ilo.org/ipec/areas/Agriculture/lang--es/index.htm

11.7.

WORKERS' FREEDOM OF ASSOCIATION AND THEIR RIGHT TO ORGANIZE ARE RECOGNIZED.

DESCRIPTION

Your farm ensures that the rights of workers to organize freely and negotiate collectively are respected as established in Conventions 87 and 98 of the International Labour Organization (ILO). Your farm makes workers aware of this policy.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Recognition of workers' rights ensures the legal compliance of your farm and avoids possible reputational risks associated with unfair treatment of workers.

WHERE TO GET MORE INFORMATION

English:

ILO Convention 87, Freedom of Association and Protection of the Right to Organise Convention
http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::p12100_instrument_id:312232

ILO Convention 98, Right to Organise and Collective Bargaining Convention
http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312243:NO

Spanish:

Convenio 87 de la OIT, relativo al libertad sindical y a la protección al derecho sindical: http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312232,es:NO

Convenio 98 de la OIT, relativo al derecho de sindicación y de negociación colectiva: http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312243,es:NO

11.8.

ALL EMPLOYMENT IS FREELY CHOSEN.

DESCRIPTION

Your farm has a written policy prohibiting forced or compulsory labor, including bonded or involuntary prison labor. All work on your farm is conducted on a voluntary basis, and not under threat or menace of penalty. This policy is communicated to your workforce.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Forced labor, often referred to by media and human rights organizations as modern day forms of slavery, represents a serious reputational risk to individual farms and the industry in general. A clear policy prohibiting forced labor that is effectively communicated and enforced, will avoid these risks and help ensure legal compliance and the fair treatment of workers.

FORCED LABOUR

The International Labour Organization (ILO) defines forced labor as "situations in which persons are coerced to work through the use of violence or intimidation, or by more subtle means such as accumulated debt, retention of identity papers or threats of denunciation to immigration authorities." (Source: ILO)

This means that forced labor includes the following actions:

- Retention of salaries, benefits, property or documents.
- Requiring financial deposits or guarantees to maintain employment.
- Physical or psychological measures to force workers to remain in your employment.
- Unreasonable notice periods to terminate employment.
- Compelling spouses or children of workers to work on your farm.

WHERE TO GET MORE INFORMATION

English:

ILO, Forced Labour Convention
http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C029

ILO, Abolition of Forced Labour Convention
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_ILO_CODE:C105

Spanish:

OIT, Convenio sobre el trabajo forzoso
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312174,es:NO

OIT, Convenio sobre la abolición del trabajo forzoso
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312250,es:NO


PACKING
PACKING SECTION

1. INTEGRATING SUSTAINABILITY INTO BUSINESS STRATEGY

INTEGRATING SUSTAINABILITY INTO BUSINESS STRATEGY

Sustainability is defined as the successful management of critical business risks for a business to continue to be profitable today and for the foreseeable future. It seeks business opportunity in efficiency, adaptability and planning for current and future resource availability changes, as well as in improving the lives of its employees and nearby communities. Sustainability is imperative to economic success in today's world and will become more so in the decades to come, as global supplies of non-renewable resources dwindle and demand grows.

A sustainable packinghouse is one that creates profit while ensuring that its business interests and the interests of the environment and society intersect. This implies not only integrating sustainability goals and strategy into the packinghouse mission, vision and value statement, but also setting yearly sustainability objectives and sharing them with appropriate stakeholders.

Integrating sustainability into your business strategy can have the following advantages:

- **Meeting procurement expectations:** An increasing number of important customers are asking packers sustainability-related questions. A packinghouse that has integrated sustainability into its business strategy is in a stronger position to answer these questions and meet the expectations for sustainable operations.
- **Improving brand value and reputation:** Making sustainability part of your business and sharing your story with mango consumers are powerful marketing tools. Brand reputation is one of the most valuable assets of a business/industry.
- **Meeting consumer demand:** Sustainability issues are becoming mainstream due to their increasing importance for consumers. As the income and market share of Generation Y and Millennials increase, so will the demand for sustainable products.
- **Increasing efficiencies:** Socially and environmentally responsible practices often go hand-in-hand with cost reductions, as is the case for water and energy efficiencies.

This chapter includes five (5) practices that packers can implement to integrate sustainability in their business strategy:

- 1.1. Your packinghouse has formally integrated sustainability into its business strategy.
- 1.2. The integration of sustainability into the business strategy has been shared with stakeholders.
- 1.3. A person or team has been designated to guide your packinghouse's sustainability strategy.
- 1.4. Yearly sustainability targets are set.
- 1.5. A system is in place to ensure legal compliance with environmental and labor standards.

1.1.

YOUR PACKINGHOUSE HAS FORMALLY INTEGRATED SUSTAINABILITY INTO ITS BUSINESS STRATEGY.

DESCRIPTION

Sustainability goals and strategies are integrated into your packinghouse's mission, vision, value statement, and are part of the business core strategy that guides daily operations.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Integrating sustainability into your company's core business model enables your business to create more value, manage risk and address today's global environmental, social and financial challenges.

Tips for implementation

Implementing the following 3 steps can help you integrate sustainability into your business strategy:

- **Strategic integration:** Integrate sustainability into your business purpose, priorities and goals to distinctively position your operation. One way of doing this is to integrate sustainability into your packinghouse mission and vision. For example, your packinghouse vision could read: "To ensure resource conservation through innovative packaging practices that maximize efficiencies in all areas of our business".
- **Operational integration:** Implement the necessary processes, policies and practices to improve the execution of your strategy (see Practices 1.4 and 1.5.). For example, your packinghouse could establish water use targets, and implement day-to-day practices to ensure they are met.
- **Cultural integration:** Leverage your business identity and culture to better engage your internal and external stakeholders in developing sustainability practices (see Practices 1.2. and 1.3.). Have open and honest conversations with your stakeholders (including transportation companies, importers, producers) about your expectations around the sustainability of their operation and of the mango production supply chain as a whole.

WHERE TO GET MORE INFORMATION

English:
https://www.unglobalcompact.org/take-action/leadership/integrate-sustainability/roadmap

1.2.

THE INTEGRATION OF SUSTAINABILITY INTO THE BUSINESS STRATEGY HAS BEEN SHARED WITH STAKEHOLDERS.

DESCRIPTION

Your employees and key external stakeholders (e.g., producers, clients, etc.) are informed about the integration of sustainability into your business strategy.

Implementation Cost

Low cost.
Costs related to the creation of communication materials.

Maintenence Cost

No cost.

Benefits

Your employees and external stakeholders play a crucial role in making your company's sustainability strategy a reality. Regularly communicating and sharing the impact of your efforts demonstrates your commitment to sustainability, and fosters the active participation of your staff and external stakeholders in programs and initiatives. Giving your employees and stakeholders ownership of the strategy will allow you to obtain long-lasting results faster.

Tips for implementation

- Ensure the commitment of senior management to the organization's sustainability goals.
- Classify employees and external stakeholders into specific groups in terms of their interest in sustainability, and craft messaging for each group.
- Use multiple communications tools (posters, team meetings, email, internal/external reports, training, etc.).
- Include sustainability as an integral part of employees' job descriptions.
- Respond to feedback, and let employees and external stakeholders know that changes are being made based on their input.

1.3.

A PERSON OR TEAM HAS BEEN DESIGNATED TO GUIDE YOUR PACKINGHOUSE'S SUSTAINABILITY STRATEGY.

DESCRIPTION

Your packinghouse's sustainability efforts are being championed and monitored by a person or a group of people, who are empowered to make decisions regarding sustainability practices.

Implementation Cost

Variable cost.
Costs are related to wages and will vary depending on whether a new position is created or if additional responsibilities are assigned to an existing position.

Maintenence Cost

Variable cost.
Costs depend on wages and will vary depending on whether a new position needs to be created or if additional responsibilities are assigned to an existing position.

Benefits

Having employees within your organization, who are responsible for the sustainability strategy, not only formalizes your commitment to sustainability, but also ensures that your business objectives are aligned with your corporate social and environmental actions.

Tips for implementation

It is recommended that the person(s) in this position be creative and innovative, in addition to having the education and technical knowledge required to develop and implement sustainability strategies.

1.4.

YEARLY SUSTAINABILITY TARGETS ARE SET.

DESCRIPTION

Annual performance targets are established for the following areas:

- Energy use and management.
- Water use and management.
- Waste reduction and waste management.
- Domestic wastewater treatment.
- Industrial wastewater treatment.

Implementation Cost

Low cost.
Costs related to the time dedicated to established the targets and to collect the necessary data.

Maintenence Cost

No cost.

Benefits

Setting specific, tangible targets can help your packinghouse measure the effectiveness of your sustainability strategies. Implementing relevant practices, policies and procedures to achieve targets and sharing these targets with your employees helps them understand important short- and long-term operational priorities and allows them to carry out activities that provide tangible business and sustainability value.

Tips for implementation

- Understand your starting point, that is, how much energy, water, or waste is currently being used or generated. This will help you set achievable and relevant targets.
- Implement relevant policies and procedures to achieve set objectives.
- While targets need to be achievable, they also need to drive innovation and change, in addition to focusing on increasing long term resource efficiency.
- Create appropriate data structures to capture and report on the status of your goals and targets.

WHERE TO GET MORE INFORMATION

English:
https://www.unglobalcompact.org/take-action/leadership/integrate-sustainability/set-goals

SETTING SMART TARGETS

Specific: It is easier to accomplish a specific target than a general one.
Measurable: Ensure your target has a specific measurable component (if you can't measure it, you can't manage it).
Achievable: The target needs to challenge people but be achievable at the same time.
Relevant: Ensure that your target is relevant and meaningful to your farm's needs.
Timely: Set a deadline for your target (one year, one month, 5 years).

1.5.

A SYSTEM IS IN PLACE TO ENSURE LEGAL COMPLIANCE WITH ENVIRONMENTAL AND LABOR STANDARDS.

DESCRIPTION

There is a person (or a team) in charge of ensuring that your packinghouse meets all applicable local, state, national and international laws, codes and regulations, including those related to the environment and labor. This person (or team) will develop a system (code of conduct, training, policies) to ensure daily operations are meeting these standards.

Implementation Cost

Variable cost.
Costs depend on in-house knowledge, and might include hiring a specialist (consultant).

Maintenence Cost

Medium cost.
Costs are related to the time needed to monitor changes of standards.

Benefits

Compliance with legal requirements ensures that generally accepted minimum performance standards are met, which in turns reduces liability for vendors and buyers.

In addition, operations that do not demonstrate legal compliance can be subject to penalties that could potentially result in substantial monetary fines and reputational damage.

Tips for implementation

- Designate a person responsible for aligning company policies, procedures and programs with national and international laws, codes, and regulations.
- Develop a code of conduct which sets expectations that employees will comply with all laws and regulations governing the operation.
- Train employees on the company code of conduct, as well as any new standards and policies.
- Document any violations within the past three years and their resolution.
- Provide the tools and resources to ensure full collaboration of different entities (administration, HR, maintenance, etc.).
- Create a Compliance Calendar to identify and implement the steps necessary to comply with each requirement.
- Develop a compliance monitoring tool to ensure the operation is aware of new laws, codes, and regulations.

A SYSTEM IS IN PLACE TO ENSURE LEGAL COMPLIANCE WITH ENVIRONMENTAL AND LABOR STANDARDS.

COMPLIANCE TRACKING TOOL

Track all applicable local, state, national and international laws, codes and regulations, including those related to the environment and labor. A supervisor can be made responsible for recording this information. An office worker can easily enter this information into the business calendar to ensure timeline will be respected.

Theme	Regulation entity	Norm	Title	Permit	Documentation needed	Timeline	Person in charge	Action items
Water Use	Department of Ecology's Water Resources Program	Water Resources Act of 1971	Curtailing Water Use	Water right permit	Form 12.1 Meter reading	02-10-2017	Y. Lopez	• Create training material • Meet with maintenance

WHERE TO GET MORE INFORMATION

Consult local, regional and national authorities to identify the environmental and labor standards your packinghouse should comply with.

English:
https://www.misa.umn.edu/publications/businessandsuccessionplanning/buildingasustainablebusiness

2. WATER USE AND MANAGEMENT

WATER USE AND MANAGEMENT

Mango packinghouse operations are dependent on constant access to clean water. Preliminary mango cleaning, hot water quarantine treatment (HWT) and hydro-cooling, are all water-intensive activities essential to the mango packing process.

As water users, packers have the responsibility to manage water resources wisely. This not only ensures that there is an adequate supply of clean water for nearby communities and ecosystems, but also that their business continues to be operational and profitable for the foreseeable future. Sustainable management of water is therefore not only an ethical responsibility for companies, but also an integral part of ensuring business viability and reducing business risk.

The purpose of this chapter is to help packers manage water sustainably, through increasing your ability to identify, prioritize and implement water saving measures, as well as practices that improve water quality. It includes three (3) practices for sustainable water use and management in packinghouses:

- 2.1. Water from packing operations is reused.
- 2.2. Water usage is known and tracked.
- 2.3. Postharvest water quality is routinely monitored and disposal options are identified accordingly.

2.1.

WATER FROM PACKING OPERATIONS IS REUSED.

DESCRIPTION

There is a system in place that allows for the reuse of water used for the following packing operations: washing, hot water quarantine treatment (HWT), and hydrocooling.

Implementation Cost

High cost.
Costs related to install recirculated water system.

Maintenence Cost

Medium cost.
Costs related to the effective and frequent sanitation of recirculated water system.

Benefits

Wastewater is generated from operations conducted at the packinghouse including washing, HWT and hydrocooling. Reusing water when possible is an effective practice to not only reduce fresh water use but also wastewater generation.

Tips for implementation

- Water reuse is done in counter flow to the production line, i.e., water used in the final rinse is of the highest quality while water used to remove field soil from the produce does not need to be of high quality. World Health Organization (WHO) guidelines specify less than 1,000 coliforms per 100 mL of water as being acceptable for washing. (FAO, 2012).
- Routinely monitor pH levels, concentration levels, and exposure levels of disinfectant. Maintain documented records.
- Clean the system routinely according to usage rates and water volume.
- Replace the water in dump tanks, hot water quarantine treatment tanks, and hydrocoolers with fresh, clean water on a daily basis, or more frequently if the water becomes unsuitable due to buildup of organic matter.

2.2.

WATER USAGE IS KNOWN AND TRACKED.

DESCRIPTION

Your packinghouse records the volume of water consumed by operations annually (including washing of fruits, Hot Water Treatment, general maintenance, etc.). This data is used to consistently reduce or minimize the quantity of water consumed per unit of mangos packed.

Implementation Cost

Medium cost. Costs related to the installation of separate water flow meters for different operations (packing, offices, etc.).

Maintenence Cost

No cost.

Benefits

Although this practice alone does not directly conserve water, accurate records are essential to effectively manage water, by identifying and eliminating unnecessary water use as well as maximizing use efficiency. It therefore serves as the basis to preventing water waste, and ensuring your equipment is properly maintained and operated.

Tips for implementation

For this practice to be easily implemented, it is essential to ensure the following:

- Create an easy-to-use recording tool (such as in Microsoft Excel) where water can be tracked for different operations (including offices, washing of fruits, Hot Water Treatment, general maintenance, etc.).
- Identify the person (people) in charge and the frequency of the recording.
- Train personnel in the use and interpretation of recorded water data.

Note that the installation of separate water flow meters for different operations (packing, offices, etc.) allows for more precision when monitoring and recording water use. If water flow meters for each operations is not an option, you can cross-reference your water bill and in-house calculations based on tank capacity and frequency of refill. This will allow you to understand general water use and water intensive operations such as Hot Water Treatment, washing, etc.

WATER USAGE IS KNOWN AND TRACKED.

WATER TRACKING TOOL

Track the water use for each meter that your packinghouse may have. This information is often on your monthly bills or on the meters. By analyzing usage, you can see dips or spikes, which you can then attribute to specific machinery, season or usage behavior by workers. An office worker can convert this information into a graph to easily analyze the data behavior.

Meter#	Use	Reading 1 (m^3)	Reading 2 (m^3)	M^3	Rain	Note	Person in charge	Action items
1	Maintenance	20,220	20,262	42	Yes (25 mm)	No	E. Espinoza	None
2	HWT	32,010	42,008	9,998	No	Check this meter, might have a leak	E. Espinoza	• Inform Raul about the potential leak.

WHERE TO GET MORE INFORMATION

Spanish:
http://www.nesc.wvu.edu/pdf/dw/publications/ontap/2009_tb/spanish/leak_detectionn_DWFSOM138.pdf

2.3.

POSTHARVEST WATER QUALITY IS ROUTINELY MONITORED AND DISPOSAL OPTIONS ARE IDENTIFIED ACCORDINGLY.

DESCRIPTION

The quality of water from the washing, HWT and hydrocooling tanks is routinely monitored for pH concentration and contaminants (including disinfectants). There is a system in place to treat and/or dispose of contaminated wastewater in a manner that ensures minimum impact on the environment and communities, as well as compliance with local environmental codes.

Implementation Cost

No cost.

Maintenence Cost

Medium cost.
Costs related to the laboratory analysis.

Benefits

Monitoring of water is essential to ensure that postharvest operations do not represent a risk to nearby waterbodies. By monitoring the water through your postharvest process, your packinghouse can ensure proper treatment and/or disposal of wastewater.

Contamination of waterbodies not only represents a physical risk to your business, as contaminated water might not be suitable for future use, it also represents a reputational risk if consumers or local communities associate your company with the pollution.

Tips for implementation

- Routinely monitor the recirculated water for free chlorine concentration and pH, and adjusted accordingly.
- Maintain monitoring records.
- Collect and correctly dispose of contaminated wastewater in a way that ensures the minimum impact on the environment and communities, as well as compliance with the local environmental codes.

WHERE TO GET MORE INFORMATION

Contact your local authorities for more information about disposal of contaminated wastewater.

WATER QUALITY TRACKING TOOL

Date	Area	Total Coliform (MPN/100ml)	Coliform fecal (MPN/100ml)	Concentration of disinfectants	Microorganism Presence and Types	Supervisor

3. ENERGY USE AND GHG EMISSIONS

ENERGY USE AND GHG EMISSIONS

Energy consumption represents a significant operational cost to packing houses and a potential risk to their financial sustainability. Furthermore, energy that is derived from fossil fuels (petroleum, oil, natural gas, coal, etc.) release pollutants known as greenhouse gases (GHG) when combusted. GHGs are causing rising global temperatures and climate change.

Civil society is becoming increasingly aware of climate change (hurricanes, drought, and extreme local weather events) and the role that the agricultural supply chain plays in further compounding the problem. Wal-Mart, Procter & Gamble, Unilever, and many other companies have established formal plans to query their respective supply chain partners on energy consumption and associated carbon emissions and, in some instances, use those results as a metric for purchasing decisions. In this context, reputational risk for a company or a sector is its willingness to measure, manage and reduce emissions in a transparent manner.

A sustainable packinghouse combines energy efficiency with the use of renewable energy technologies that do not emit GHGs. Using these strategies, there is an opportunity for individual packers to reduce costs and environmental impact, which in turn can be used to develop preferred relationships with customers and consumers.

Energy management includes the following seven (7) practices:

- 3.1. Fruit fly treatment uses renewable energy to heat water.
- 3.2. Electricity to power the packing plant is obtained either fully or partially from renewable energy.
- 3.3. Energy efficient equipment is used and maintained regularly.
- 3.4. Wherever possible, natural illumination is used instead of lights.
- 3.5. The amount of electricity bought from a third-party provider is known and tracked.
- 3.6. Energy efficiency is continuously improved.
- 3.7. Energy saving practices are used in cold storage rooms.

GHG emission reduction include the following five (5) practices:

- 3.8. Direct GHG emissions are measured.
- 3.9. Refrigeration units use refrigerant gases that are non-ozone depleting and have a zero or low greenhouse gas impact.
- 3.10. Fuel efficient vehicles are used.
- 3.11. Transportation of product from orchards to packinghouse is optimized.
- 3.12. Work with third party transport companies to use most efficient vehicles and packing methods.

3.1.

FRUIT FLY TREATMENT USES RENEWABLE ENERGY TO HEAT WATER.

DESCRIPTION

Solar energy is used to heat the water in the HWT. Solar energy systems can attain temperatures of about 60-80°C, thereby easily reaching the required temperature of 46.1oC (115oF) needed for fruit fly hot water treatment.

** Not relevant for those packing houses that are in the fruit fly free zone in northern Mexico.

Implementation Cost

High cost.
Costs related to high capital investment in the purchasing and installation of solar water heaters

Maintenence Cost

Low cost.
Costs related to simple maintenance and cleaning at regular intervals.

Benefits

Although an initial capital expenditure is needed, utility bills are significantly lower as a result of using free energy for this traditionally expensive practice. In some regions, renewable energy subsidies are available. In addition, the implementation of this practice will decrease your environmental footprint by reducing the release of atmospheric pollutants, including greenhouse gases.

Tips for implementation

It is important to use professional guidance so that the correct capacity and temperatures are attained from the solar unit.

WHERE TO GET MORE INFORMATION

Mexico:

The Mexican government is currently providing incentives for investing in solar energy. Post-harvest operations can receive up to 50% of their total capital in subsidy through this program. Another incentive program is the Fideicomiso de Riesgo Compartido (FIRCO) or Trust Fund for Shared Risk, which focuses on the agricultural sector. This incentive applied to barely 5% of the entire solar thermal market in 2012, according to figures from FAMERAC.

http://www.firco.gob.mx/componentes%20_2016/Paginas/Productividad_Agrolimentaria.aspx
http://solarthermalworld.org/content/mexico-training-and-site-inspection-agricultural-solar-systems

Brazil:

Renewable energy tax incentives through the INNOVA ENERGIA program.

3.2.

ELECTRICITY TO POWER THE PACKING THE PLANT IS OBTAINED EITHER FULLY OR PARTIALLY FROM RENEWABLE ENERGY.

DESCRIPTION

The packing house obtains a significant portion of its electricity budget from non-polluting, renewable sources such as solar, wind, or, bio-effluent.

Implementation Cost

High Cost.
Costs related to capital investment in hardware.

Maintenence Cost

Low cost (for solar and wind).
Costs related to cleaning and regular equipment maintenance.

Benefits

Although installing a renewable energy system often requires a high initial capital investment, operating costs are significantly lower than traditional energy sources. An additional benefit for society is reduced release of atmospheric pollutants, including greenhouse gases.

Tips for implementation

It is important to use professional guidance to select the appropriate system, and ensure correct installation and adequate capacity.
Many national and state governments in Latin America provide subsidies to those businesses wishing to incorporate renewable energy into their operations.

WHERE TO GET MORE INFORMATION

Please refer to Practice 3.1

3.3.

ENERGY EFFICIENT EQUIPMENT IS USED AND MAINTAINED REGULARLY.

DESCRIPTION

Your packinghouse prioritizes the use of energy efficient equipment, replacing older less efficient equipment when required. This includes the use of energy efficient light bulbs (such as LEDs), pumps, compressors and motors, as well as refrigeration units. It also includes the best behavioral practices when using equipment:

- Machines and lights are not left on when they are not being used.
- Air conditioning is used adequately to maintain a comfortable working environment only during working hours.

Implementation Cost

High cost.
Costs related to hardware investment.

Maintenence Cost

Variable cost.
Costs related to occasional replacement and professional maintenance assessments.

Benefits

Energy use has high cost and impacts profit margins. Using energy efficient equipment wisely can significantly reduce this cost, while also reducing the negative effects of pollution and climate change that results from using energy from fossil fuels.

Tips for implementation

- List all the equipment in your packinghouse, including lights and fans (that use electricity, diesel, LPG, etc.) and rank them in function of their energy use.
- For all the equipment listed, estimate how much energy they consume and how much it would cost to replace them with an energy efficient alternative, if one exists, and how much energy you would save. Also, make note of ideas for increasing the efficiency of each item without replacement; this could include regular maintenance, or running only during office hours.
- Start replacing the equipment that will get the most energy savings and involve no additional cost and go down the list. Continue with the low-cost items and then the higher cost equipment. Schedule implementation according to available budget and plan further implementation steps.

WHERE TO GET MORE INFORMATION

See Practice 3.1

3.4.

WHEREVER POSSIBLE, NATURAL ILLUMINATION IS USED INSTEAD OF LIGHTS.

DESCRIPTION

Your packinghouse takes advantage of natural lighting to reduce the use of electric lighting. This could include using skylights or lighting tubes that reflect light to dark areas within your packinghouse.

Implementation Cost

Medium to low cost. Costs related to potential remodeling and construction.

Maintenence Cost

No cost.

Benefits

Reducing the need for electric lighting can reduce energy bills significantly.

Tips for implementation

Skylights that are not adequately thermally protected can transfer excess heat into the packinghouse. Only correct skylights should be used so that additional air conditioning is not needed as a result of implementing this practice.

WHERE TO GET MORE INFORMATION

Obtain the opinion of a professional for guidance

3.5.

THE AMOUNT OF ELECTRICITY BOUGHT FROM A THIRD-PARTY PROVIDER IS KNOWN AND TRACKED.

DESCRIPTION

Procedures are in place that allow for:

- Accurate and frequent recording of the amount of electricity used from a third-party provider.
- Energy demand from different work areas to be easily differentiated.
- Historical data to be easily obtained and analyzed against current use.

Implementation Cost

Variable cost.
Costs related to employee(s) time spent recording and compiling data. If more than one meter is necessary higher costs relating to metering different work sections will be incurred.

Maintenence Cost

Low cost.
Costs related to compiling historic data.

Benefits

Knowledge of costly inputs, such as electricity, allows managers to effectively search for and implement efficiencies. Depending on the way electricity is generated (i.e. if fossil fuels are used such as diesel or coal), an additional benefit for society is reduced release of atmospheric pollutants, including greenhouse gases.

Tips for implementation

Energy usage should be corroborated using both billing information and meter readings. At a minimum, the amount of electricity is recorded on a monthly basis and the machinery (purpose) it was used for. The reports should be regularly monitored by packinghouse managers to search for anomalies and areas in which efficiency and costs reductions can be found, such as operating at off-peak times, maintaining and updating machinery.

THE AMOUNT OF ELECTRICITY BOUGHT FROM A THIRD-PARTY PROVIDER IS KNOWN AND TRACKED.

ELECTRICITY TRACKING TOOL

Track electricity use for each meter that your packinghouse may have. This information is often on the bills that you receive each month. By analyzing usage, you can see dips or spikes, which you can then attribute to specific machinery, season or usage behavior by workers. An office worker can easily convert this information into a graph to analyze the data behavior.

Meter#	Month	Equipment & Purpose*	Reading 1	Reading 2	kWh	Cost	Supervisor
1	April		23465	123565	100	$20	M. Gonzalez
2	April		3201	3251	50	$10	J. Rodriguez
1	May		123565	123765	200	$40	M. Gonzalez
2	May		3251	3351	100	$20	J. Rodriguez

*Please list equipment and purpose measured by each meter.

WHERE TO GET MORE INFORMATION

English:
http://www.ghgprotocol.org/standards/corporate-standard

Spanish:
http://bit.ly/2pixrCc

3.6.

ENERGY EFFICIENCY IS CONTINUOUSLY IMPROVED.

DESCRIPTION

Systems are in place that seek greater efficiency from the machinery used in your packinghouse. These include reducing vehicle use, no idle policies, regular maintenance and updates of all machinery, as well as seeking renewable energy options where possible, such as solar and wind energy. Energy efficiency improvements ensure that your packinghouse is decreasing the intensity of energy use relative to overall product output.

Implementation Cost

Low cost.
Costs related to training and policy development.

Maintenence Cost

Low cost.
Costs related to occasional update of training material and policies.

Benefits

Reducing the amount of energy consumed can significantly reduce operating costs. Energy, in the form of burning fossil fuels, has a severe impact on the global atmosphere and the reduced use of these substances is an important sustainability goal.

Tips for implementation

Packinghouse managers, armed with packinghouse energy use data (see Practice 3.1 and 3.2) should seek low-cost energy reduction solutions. There are many low- to no-cost energy efficiency solutions, such as:

- Turning engines off when vehicles are not in use (no idling policy).
- Planning trips to minimize vehicle use.
- Implementing renewable energy, such as solar panels for water heating, lights and pumps.

3.7.

ENERGY SAVING PRACTICES ARE USED IN COLD STORAGE ROOMS.

DESCRIPTION

Energy consumption in cold storage rooms is reduced through the implementation of efficiency practices. These include:

- Installation of strip curtains to isolate and maintain constant temperatures in areas that contain ready-to-ship crates and avoid cooling other areas.
- Use of thermal insulation in walls and doors.
- Use of double entry, with acclimatization chamber between them, so that cold air does not escape through a single entryway.
- Self-closing doors that seal on closing.
- Maintaining loading docks closed unless in use.
- Use of high-energy efficiency refrigeration units with upgraded logic controllers. For example, energy use can be reduced through:
    - Single centralized multiplex refrigeration systems.
    - Changing air cooled condensers to evaporative condensers.
    - Floating head pressure controls.
    - High efficiency fan motors and use of Variable frequency drives (VFD).
- Regularly maintaining refrigeration units, and cleaning compressor surfaces.
- Use of LED lighting.
- Installation of occupancy sensors in different aisles so that lighting is only used where needed.
- Use of photo sensors to turn lights on and off where there is enough natural lighting.

Note: When considering upgrades to refrigeration units use a non-ozone depleting refrigerant that has low climate change impact.

ENERGY SAVING PRACTICES ARE USED IN COLD STORAGE ROOMS.

Implementation Cost

Variable cost.
Costs related to purchase of equipment and labor. Although recommended, costs will increase further if a consultant is used to undertake an energy evaluation.

Maintenence Cost

Low cost.
Costs related to regular assessments, maintenance and occasional replacement.

Benefits

Refrigerated storage rooms use a significant amount of energy, up to 70% of total energy consumption in some cases. Efficiencies can significantly reduce costs.

Tips for implementation

Low cost measures include the implementation of policies on the closing of doors at entry points including loading dock gates.

WHERE TO GET MORE INFORMATION

If more information is needed an energy efficiency consultant could be used to provide an analysis of the current state of energy use and to prioritize measures ranked against their implementation cost.

English:
https://energytrust.org/library/GetDocument/3444

Spanish:
http://www.aefyt.com/wp-content/uploads/2014/07/AEFYT-GUIA-PARA-LA-MEJORA-DE-LA-EFICIENCIA-ENERGETICA-DE-LA-I.-F.-MAYO-2014-Indice.pdf

3.8.

DIRECT GHG EMISSIONS ARE MEASURED.

DESCRIPTION

Each year, GHG emissions from your packinghouse are quantified according to standard protocols (such as the Greenhouse Gas Protocol). This includes emissions from direct sources ("scope 1") and third-party generated electricity ("scope 2"), that are emitted through packinghouse operations. Records from past years are maintained, including the raw data, methodologies of data collection and analysis and final quantity of gases from each source.

Implementation Cost

High cost.
Costs related to hiring specialist consultants.

Maintenence Cost

Low cost.
Costs related to personnel recording data in monthly reports.

Benefits

- A greenhouse gas emissions analysis can help with planning. For example, when deciding upon the purchase of new equipment, it is important to take into consideration the type of fuel, its efficiency and hence contribution to the overall emissions of the facility.
- Consumers sometimes use the carbon footprint to make purchasing decisions and hence it is important that the mango industry: (a) Monitor emissions across the supply chain, and (b) Reduce emissions as much as is possible.
- It is important that packinghouses maintain records so that whole industry emissions are known and can be presented to consumers.

Tips for implementation

It is suggested that a professional undertake the first emissions analysis to set up the methodology and required templates so that your efforts align with global standards. In subsequent years, packing staff can undertake the analysis. However, it is highly recommended that third party assessors occasionally be asked to audit the calculations.
In order to prepare for a GHG emissions analysis you will need to collect information on your fuel usage such as petroleum and natural gas as well as electricity usage, that was used for any machinery owned by your company. In addition, you will need information on refrigerant gas used in your cooling units with volumes added to machines during the year.

WHERE TO GET MORE INFORMATION

English:
http://www.ghgprotocol.org

Spanish:
http://www.ghgprotocol.org/files/ghgp/public/protocolo_de_gei.pdf

3.9.

REFRIGERATION UNITS USE REFRIGERANT GASES THAT ARE NON-OZONE DEPLETING AND HAVE A ZERO OR LOW GREENHOUSE GAS IMPACT.

DESCRIPTION

Your packinghouse has a record of each cooling unit (e.g. A/C., cold room) and its refrigerant gas type. All ozone depleting gases are removed and the units upgraded to use a non-ozone depleting alternative with a low carbon emission value.

Implementation Cost

Variable cost.
Costs depend on whether existing units can easily be retrofitted with new gas. Costs can be spread over years, working from affordable office A/C units to cold storage units as budget allows.

Maintenence Cost

Low cost.
Costs related to occasional gas refills and unit maintenance.

Benefits

Compliance with new rules and laws will help avoid regulatory risks, and circumvent any unnecessary fines and stoppages. Also, upgrades to refrigeration units often increases efficiency and can cut costs over time as well as avoid ozone depletion.

Tips for implementation

It is suggested that you check current refrigerant gases being used in each unit and note which ones are still using CFCs such as R-22. You should then investigate new refrigerant options. Some new refrigerants can be used as a direct replacement; others need upgrades to the unit. However, it is important that the new refrigerant gas used has a low greenhouse gas potential e.g., HFO blends, R-32.

WHERE TO GET MORE INFORMATION

English:
http://bit.ly/2p24V7v
https://www.epa.gov/ods-phaseout/phaseout-class-ii-ozone-depleting-substances

REFRIGERATION GASES

Refrigeration units use gases that cool when decompressed. Older units used a class of gases known as HCFCs and CFCs (e.g. R-22) that destroy the ozone layer of the Earth's atmosphere. These gases have been banned from import and production in all developing countries, with full phase out by 2040.
Many new generation gases (HFCs) are non-ozone depleting but are greenhouse gases that are many thousands of times more potent than carbon dioxide. HFCs will also be phased out under a new international treaty in the future.
Other alternatives include ammonia as a refrigerant although this gas must be handled with extreme care. Newer refrigerant gases using hydrocarbons have no ozone depleting qualities and a small carbon footprint are in development.

3.10.

FUEL EFFICIENT VEHICLES ARE USED.

DESCRIPTION

Vehicles are regularly maintained and the fleet is renewed regularly to obtain the highest fuel efficiency possible.

Implementation Cost

Medium to high cost. Costs related to the regular maintenance of vehicles is offset by lower fuel costs.

Maintenence Cost

No cost.

Benefits

Costs will be reduced by using fuel-efficient vehicles. At the same time, the carbon footprint of mangos will also be reduced, making them more appealing to consumers.

Tips for implementation

- Keep and perform a regular maintenance schedule for all vehicles owned and operated by the packing facility.
- Replace older less efficient vehicles with more fuel efficient alternatives when possible.

3.11.

TRANSPORTATION OF THE PRODUCT FROM ORCHARDS TO THE PACKINGHOUSE IS OPTIMIZED.

DESCRIPTION

The use of fuel in vehicles is minimized by reducing unnecessary trips made by vehicles to transport product from farms to packing facilities. This can be achieved by optimizing the number of mangos packed per crate and the number of crates carried per vehicle.

Implementation Cost

Low cost.
Costs related to logistics and preparation using existing personnel.

Maintenence Cost

No cost.

Benefits

Reduction in fuel use will reduce cost, as well as the GHG emissions of the operation.

Tips for implementation

You can develop procedures on transportation of product from orchards to packinghouse.
You can train drivers and employees so that they understand that fuel efficiency is a company policy.

3.12.

WORK WITH THIRD PARTY TRANSPORTATION COMPANIES TO USE MOST EFFICIENT VEHICLES AND PACKING METHODS.

DESCRIPTION

Packing facility management seeks to reduce emissions from heavy trucks by working with transport vendors and encouraging them to use efficient trucks and to load trucks to their optimal capacity. Packing facilities use the vendors that are proven to be the most efficient.

Implementation Cost

Low to Medium cost. Costs related to procurement personnel developing contacts and assessment procedures for vendors.

Maintenence Cost

No cost.

Benefits

Transportation of product is the biggest source of greenhouse gases in the mango supply chain which has a major effect on consumer purchasing decisions. The mango industry will benefit if it can show that it is doing all it can to reduce emissions that are produced from this link in the supply chain. Doing so may also help reduce costs related to fuel consumption.

Tips for implementation

An efficiency program can be developed between the packinghouse and transportation vendors, that includes evaluation, monitoring and shared incentives. It has been shown that collaboration with partners in the supply chain can effectively be used to manage carbon emissions with little capital investment, by only making operational adjustments.

WHERE TO GET MORE INFORMATION

English:
http://www.inboundlogistics.com/cms/article/vendor-compliance-setting-them-straight/\\
http://oa.upm.es/22273/1/FRUTURA_II__ISBN.pdf
http://ieeexplore.ieee.org/document/6248180/?reload=true

4. WASTE MANAGEMENT

WASTE MANAGEMENT

Food waste, from field to plate, is emerging as a major topic of concern in agricultural production and distribution. Every wasted mango has received the same inputs - such as labor, water, fertilizers, and energy - as those that eventually reach the consumer. Reducing fruit waste is therefore not only a way to better allocate human and natural resources, but also a way for packers to ensure that each dollar invested in their packinghouse is spent on fruits that will reach consumers and generate revenue. Proper waste management can prevent environmental contamination, generate revenue through the sale of waste, and minimize regulatory risk by ensuring compliance with local laws. On the retail side, a growing number of large customers are asking their supply chains to report their waste management practices. Being able to rigorously report improvements can demonstrate the sustainability commitments of mango suppliers to these retailers, and serve as a market differentiator.

Proper waste management is key to a sustainable mango distribution strategy, and many solutions are easy to implement and can yield significant results. Sustainable waste management implies not only reducing waste, but capturing and returning what remains as a resource back into the economy.

A basic waste management strategy includes the following principles:

- Minimize waste sent to landfill.
- Increase recycling.
- Reduce waste wherever possible.
- Treat waste as a resource that should be sold when possible.
- Responsible manage waste that cannot be sold by either turning it into energy or by reusing it as compost.

The following eleven (11) practices can help packers to act upon these principles:

- 4.1. Open garbage dumps and open burning of waste are not permitted.
- 4.2. The area surrounding dumpsters, waste containers and compactors is regularly maintained and inspected.
- 4.3. A waste management plan has been developed and is implemented.
- 4.4. Solid waste from the washing process is separated from wastewater and analyzed.
- 4.5. Fruit waste is separated from other types of waste for composting.
- 4.6. Fruit waste is donated.
- 4.7. Fruit waste is sold to a third-party.
- 4.8. Recyclable material is sent to be recycled.
- 4.9. Reusable crates are used for the transportation of mangos from the field.
- 4.10. Broken pallets are repaired and reused when possible.
- 4.11. Unusable pallets are recycled or sent to a biomass waste-to-energy system.

4.1.

OPEN GARBAGE DUMPS AND OPEN BURNING OF WASTE ARE NOT PERMITTED.

DESCRIPTION

All waste is disposed of in closed containers and burning of waste is not permitted. There is a system in place to ensure cleaner healthier solutions to garbage disposal. Your packinghouse implements alternatives to onsite open garbage dumps or open burning of waste, including:

- Composting (see Practice 4.6).
- Donations of fruit waste to nearby communities, local organizations, or as cattle feed (see Practice 4.7).
- Repurposing (see Practice 4.8).
- Recycling (paper, plastic) (see Practice 4.9).
- Closed containers for waste collected by a proper authority.
- Waste-to-energy incinerators.

Implementation Cost

Low cost.
Costs related to finding alternative to burning of waste.

Maintenence Cost

No cost.

Benefits

Sustainably managing your waste reduces the environmental impact of your operation:

- Open waste dumping attracts rodents and pests and poses serious threats to groundwater resources and soil resulting from the leaching of toxic chemicals.
- Open burning of waste leads to the release of many air pollutants and hazardous byproducts, including heavy metals, dioxins and furans.

WHERE TO GET MORE INFORMATION

Contact your municipality to obtain information on landfill operations, solid waste collection services, transfer stations and recycling facilities.

English:
https://www.env.nm.gov/aqb/projects/openburn/OKopenburnfactsheet.pdf

Spanish:
http://www3.cec.org/islandora/en/item/11405-la-quema-de-residuos-agr-colas-es-una-fuente-de-dioxinas-es.pdf

4.2.

THE AREA SURROUNDING DUMPSTERS, WASTE CONTAINERS AND COMPACTORS IS REGULARLY MAINTAINED AND INSPECTED.

DESCRIPTION

The area surrounding dumpsters, waste containers and compactors is inspected at least once a month for leaks, spills, litter and pests, and corrective actions are taken when needed. Corrective actions include:

- Replacing leaking containers.
- Increasing recollection frequency.
- Applying absorbent materials (e.g., kitty litter) over any liquids spilled.
- Placing liquid waste in closed/sealed containers.
- Sweeping the loading dock area regularly.
- Adopting regular dumpster-area cleaning procedures that include sweeping and using environmentally friendly soaps (that don't require water).

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Poor management of waste receptacles and surrounding areas can lead to an increase in pests and contaminate surface and ground water resources. Maintaining this area clean and free from leaks and debris will aid in food safety efforts, protect the environment and ensure a clean working environment for your employees.

Tips for implementation

Develop a dumpster area maintenance procedure including:

- Creation of an inspection checklist.
- Definition of clear steps to keep area clean.
- Training the person in charge of inspection.
- Posting of signs that indicate the materials that can be placed in the dumpster.
- Completion of a brief inspection report.

THE AREA SURROUNDING DUMPSTERS, WASTE CONTAINERS AND COMPACTORS IS REGULARLY MAINTAINED AND INSPECTED.

INSPECTION CHECKLIST

The inspection checklist should also include a diagram of area (use drawings to identify/locate hazards) and an equipment inventory (know what type of machinery or equipment is present).

Items	Yes	No	Observation
Is safe access to food waste and trash containers maintained?			
Is the disposal area free from broken glass, metal cans and food spillage?			
Are food waste and refuse containers adequate in number, insect/rodent proof?			
Are there proper holding racks and/or dollies for garbage containers?			
Is combustible trash stored away from the building?			
Is smoking forbidden in trash storage areas?			
Are dumpster covered & drain plug(s) in place?			
If garbage bags are used, are they properly sealed and placed (not thrown)?			

4.3.

A WASTE MANAGEMENT PLAN HAS BEEN DEVELOPED AND IS IMPLEMENTED.

DESCRIPTION

Your packinghouse has a comprehensive, current written waste management plan that outlines the methods of waste management from generation to final disposal. The plan includes procedures to track waste and to avoid and/or minimize wastage including recycling, reuse and repurposing. The plan considers potential sites of air, soil and water contamination, and indicates actions to minimize pollution from waste.

Implementation Cost

Low cost.
Costs related to the time needed to create of the plan.

Maintenence Cost

No cost.

Benefits

Waste management is fundamental to a sustainable business. In a closed loop economy, waste is considered a market failure. The development of a waste management plan prepares your organization to effectively manage its waste, from creation to final disposal. This practice will help your packinghouse avoid and/or minimize wastage and pollution, reduce waste-related costs and potentially generate revenue.

Tips for implementation

The creation of a waste management plan includes the following:

- **Where are we now?** Perform a waste assessment to identify possible types of waste and sources of pollution, and which areas may need most attention (see more information in text box). Take into consideration food waste from cafeteria, water from the mango washing process, HWT, etc.
- **Where do we want to be?** Establish precise waste reduction objectives.
- **What do we need to do to get there?** Identify clear steps, new procurement policies, training, etc.

A WASTE MANAGEMENT PLAN HAS BEEN DEVELOPED AND IS IMPLEMENTED.

INFORMATION TO BE ADDED IN YOUR WASTE MANAGEMENT PLAN

1. INTRODUCTION

Background information: (i) Company name, site name and site location; (ii) Effective date of the plan; (iii) Purpose and scope of the plan including detailed waste management goals and objectives.

It is recommended that the goals and objectives consider the following factors: environmental (water, air, wildlife), social (economic impacts, and public interests) and regulatory (compliance, regulations, authorizations, land-use permits, and water licenses).

2. IDENTIFICATION OF WASTE TYPES

This section includes (i) Description of waste characteristics, (ii) Description of the source of generation, (iii) Estimation of the volume/mass to be produced; and (iv) Potential environmental effects.

3. MANAGEMENT OF EACH WASTE TYPE

This section should include (i) Description of the activities involved in the management from generation to disposal and (ii) The method(s) that will be employed to manage each waste type.

WHERE TO GET MORE INFORMATION

English:
https://mvlwb.com/sites/default/files/documents/MVLWB-Guidelines-for-Developing-a-Waste-Management-Plan-Mar-31_11-JCWG.pdf

4.4.

SOLID WASTE FROM THE WASHING PROCESS IS SEPARATED FROM WASTEWATER AND ANALYZED.

DESCRIPTION

There is a system in place that prevent the discharge of potentially contaminated latex, dust, dirt, and leaves into canals and other waterbodies. The collected waste is then properly monitored for chemicals and metals. Waste disposal is determined according to monitoring results.

Implementation Cost

Variable cost.
Costs related to the installation of a waste trap in the water tank and to the fees related to properly testing the residue.

Maintenence Cost

Low cost.
Costs related to the monitoring of soil, latex, and other materials removed in the washing process.

Benefits

Soil, latex, and other materials removed in the washing process can contain agricultural chemicals from the field. Improper management of this waste can therefore contaminate water bodies.

Contamination of waterbodies not only represents a physical risk to your business, as contaminated water might not be suitable for future use, it also represents a reputational risk if consumers or local communities associate your company with the pollution.

WHERE TO GET MORE INFORMATION

Contact local authorities for information about proper disposal of washing tank waste in your region.

4.5.

FRUIT WASTE IS SEPARATED FROM OTHER TYPES OF WASTE FOR COMPOSTING.

DESCRIPTION

Fruit that is unfit for human consumption is diverted from the general waste stream and used to prepare compost.

Implementation Cost

Low cost.
Costs related to the installation of a proper composting system.
Usage of compost may offset implementation costs.

Maintenence Cost

Low cost.
Costs related to the maintenance of compost.
Usage of compost may offset maintenance costs.

Benefits

The production of compost allows for a high volume of organic waste to be turned into a natural organic fertilizer that can be used on local farms. Importantly this practice reduces the amount of organic waste going to landfills under which conditions it produces methane, a greenhouse gas 25 times more potent than carbon dioxide. Given that poorly managed compost can also produce methane, it is imperative to implement the composting system correctly.

There is a potential cost saving, related to landfill fees, if you sell/give your fruit waste to a third-party for composting.

Tips for implementation

- Ensure the compost maintains a temperature between 131 and 170°F for 3 days (enclosed system) or 15 days (windrow system). During this period, turn the composting materials a minimum of five times. After these steps, cure the compost pile for 45 days. Cover any finished and curing compost piles in order to prevent recontamination.
- Maintain the composting site dry, well drained, and slightly sloped (1-2% best), and ensure it is located at least 100 meters from living areas, schools or other areas of daily human activity.
- Keep detailed records of pile type (aerobic vs. anaerobic, enclosed, windrow, etc.), temperature and moisture management, dates turned, and the duration of high temperatures.

IS YOUR COMPOST READY TO USE?

- Test its temperature: Compost that is significantly warmer than ambient conditions might not be mature for use.
- Smell it: Immature compost often has an unpleasant smell.
- Visible food chunks: A mature compost should take the form of a dark-brown or black organic substance.
- If the texture of your compost is too woody, it might be preferable to use it as mulch instead of compost.

WHERE TO GET MORE INFORMATION

English:
http://www.fao.org/docrep/014/i2230e/i2230e14.pdf

Spanish:
http://www.fao.org/3/a-i3388s.pdf

4.6.

FRUIT WASTE IS DONATED.

DESCRIPTION

There is a system in place to donate fruit that is appropriate for human consumption but is not fit to be sold for the export or local market, or to the juice factories.

Potential beneficiaries of fruit may include: food banks, nearby residents in need, local charities, cattle ranchers, etc.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Donating fruit for human or animal consumption has been identified by the Food and Agricultural Organization of the United Nations as the best way of addressing food waste while also fighting food poverty.

Tips for implementation

Determine the frequency and quantity of food waste that can be donated, as this will help receivers plan the pick-up schedule.

WHERE TO GET MORE INFORMATION

Ecuador:
http://diakonia-ec.org/como_ayudar

Peru:
http://bancodealimentosperu.org/

Mexico:
https://bamx.org.mx

Brazil:
www.sesc.com.br/mesabrasil

4.7.

FRUIT WASTE IS SOLD TO A THIRD-PARTY.

DESCRIPTION

Mangos that are not sold to the domestic or international market (based on aesthetic characteristics) are sold to juice factories or another customer.

Implementation Cost

No cost.
The implementation of this practice provides revenue.

Maintenence Cost

No cost.

Benefits

Rejection of food products based on aesthetics is often cited as the major cause of food loss and waste. Identifying alternative uses for mango waste is a sound sustainability principle, given that it prevents fruit waste being sent to landfill, in addition to diversifying income streams.

Tips for implementation

Identify local fruit processors as potential buyers of fruit waste.

4.8.

RECYCLABLE MATERIAL IS SENT TO BE RECYCLED.

DESCRIPTION

Your packinghouse has a system in place to separate recyclable materials (paper, plastic, metals, etc.) using designated recycling containers, and third party agreements for pick up and recycling.

Implementation Cost

Low cost. Costs related to the creation and implementation of your recycling program (time, installations, etc.) The sale of recyclable material can offset implementation costs depending on the region and material recycled.

Maintenence Cost

No cost.

Benefits

Recycling diverts material from landfills and incinerators and reduces the environmental impact of your packing operations. In some regions, recyclable material can be sold to merchants, creating an income stream.

Tips for implementation

Establishing a recycling system involves:

- Determining your storage method (recycling bins, larger outdoor storage containers).
- Selecting your collection method (self-hauling vs. service provider).
- Making environmentally-friendly purchasing decisions (to cut waste and increase recyclable material).
- Training employees on new procedures.

BENEFITS OF RECYCLING

Recycling one ton of paper can save 17 trees, 7,000 gallons of water, 380 gallons of oil, 3.3 cubic yards of landfill space and 4,000 kilowatts of energy.

Recycling 1 ton of plastic saves 2,000 pounds of oil in addition to save 7.4 cubic yards of landfill space.

WHERE TO GET MORE INFORMATION

Contact local environmental authorities and local recycling companies for more information.

4.9.

REUSABLE CRATES ARE USED FOR THE TRANSPORTATION OF MANGOS FROM THE FIELD.

DESCRIPTION

The transportation of mangos from the field to the packinghouse is done using reusable containers (plastic, corrugated, solid fiber, wood or metal).

Implementation Cost

Variable cost.
Costs related to buying reusable crates.
Implementation costs can be offset since crates can be reused multiple times before new ones are needed.

Maintenence Cost

Low cost.
Costs related to reparation of reusable crates (if/when needed).
Maintenance costs can be offset since crates can be reused multiple times before new ones are needed.

Benefits

In addition to preventing damage to the fruit and reducing organic waste, the use of reusable crates to transport mangos from the field to your packing facility also contributes to reducing the quantity of solid waste generated (versus disposable crates) as crates are washed, stacked and reused.

Tips for implementation

When using reusable crates, it is suggested to look out for the following:

- Chose the material of the reusable crates according to its strength, durability and cleanliness.
- Clean and sanitize crates used for transporting fresh mangos after each use to avoid food safety risks.
- Properly mark crates that have been in direct contact with compost, chemicals or manure, and ensure they do not enter the packinghouse at any time.
- Store crates in an area that is clean, dry, and free from trash, insects, and animals.

WHERE TO GET MORE INFORMATION

English:
http://www.fao.org/3/a-i0930e.pdf

4.10.

BROKEN PALLETS ARE REPAIRED AND REUSED WHEN POSSIBLE.

DESCRIPTION

Damaged pallets are repaired and used again. This includes but is not limited to:

* Replacing missing boards.
* Replacing damaged boards.
* Replacing any missing nails or other materials.
* Repairing twisted or warped pallets.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to repairs of pallets (if/when needed).
Costs saving versus purchasing new pallets.

Benefits

By repairing broken pallets, you can reduce safety hazards, save money, reduce your packing facility's environmental footprint (save trees and energy required to produce the pallets) and keep landfills free from recyclable material.

Companies that use high quality repairable pallets can also save as much as $3 to $4 per pallet by repairing them in-house.

Tips for implementation

Train workers to carry out minor or major repairs to broken pallets for a fraction of the cost of buying new ones.
Repaired pallets for export must meet the standards laid out in the ISPM 15 Requirements.

WHERE TO GET MORE INFORMATION

English:
https://www.ippc.int/static/media/files/publication/en/2016/06/ISPM_15_2013_En_2016-06-07.pdf

Spanish:
https://www.ippc.int/static/media/files/publication/es/2016/06/ISPM_15_2009_Es_2016-06-07.pdf

4.11.

UNUSABLE PALLETS ARE RECYCLED OR SENT TO A BIOMASS WASTE-TO-ENERGY SYSTEM.

DESCRIPTION

At the end of its life, when a pallet is no longer reparable, it is either recycled or sent to a nearby biomass waste-to-energy system (when available).

Implementation Cost

No cost.
May even generate revenue if biomass generators pay for pallets.

Maintenence Cost

No cost.

Benefits

Pallet recycling companies and biomass generators may pay for pallets or take them for free, reducing disposal costs or even generating revenue. Recycling wood packaging can result in reductions in greenhouse gas emissions (compared to disposal via landfill or open burning).

WHERE TO GET MORE INFORMATION

Identify and contact your local recycling companies, or biomass generator for more information.

5. WORKER COMPENSATION

WORKER COMPENSATION

An excellent workforce is key to improving productivity, profitability and therefore, sustainability. As packers are aware, food packing and processing are industries that tend to attract vulnerable populations to their workforce. Given this, ensuring strict adherence to labor laws and treating workers with respect and dignity are also important for companies to avoid reputational risks, particularly given the increasing concern of consumer and worker organizations with social responsibility. Areas of particular concern for food packing operations include working hours, social security benefits, and wage levels.

The correlation between fair treatment of workers and food safety, product quality and productivity generally have begun to be studied by certification bodies and worker organizations. Equitable treatment may also reduce the risk of labor shortages due to uncompetitive salaries and unfavorable labor conditions, and increase retention of skilled workers. Ensuring that operations provide economic opportunities for all workers is a sustainable business decision, that also helps avoid significant reputational risk.

The following nine (9) practices are designed to help you ensure legal compliance, and foster positive relations with your workers by ensuring their well-being through adequate compensation and fair and transparent policies.

- 5.1. Minimum wage or greater is paid to all employees.
- 5.2. A living wage level has been established and is paid to employees.
- 5.3 Work based on production (quotas and piecework) is paid at least at a level proportionate to minimum wage.
- 5.4. Deductions from salaries are only permitted if stipulated by national laws and/or if written consent is given by the employee.
- 5.5. All overtime is voluntary, and paid at a premium.
- 5.6. Full-time employees and temporary workers employed for 3 months or more have a legally-binding contract with your packinghouse.
- 5.7. Payments to workers are made at regularly scheduled intervals and documented with a pay slip.
- 5.8. Migrant, seasonal, and temporary workers are granted the same rights and benefits as permanent workers.
- 5.9. Workers are allowed at least one day of rest for every 6 consecutive days worked.

5.1.

MINIMUM WAGE OR GREATER IS PAID TO ALL EMPLOYEES.

DESCRIPTION

Nationally- or regionally-mandated minimum wage is paid to all employees, whether full-time or seasonal. This level of minimum pay is maintained even when there are conditions that limit daily production at the packinghouse. The cost of housing, food or other services is not considered part of the payment of minimum wages.

Your packinghouse pays workers in cash or other form easily converted into money, such as direct deposit or check from a local bank. Payment is not made in-kind or in a manner not easily negotiable, such as credit or vouchers.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to payment of minimum wage or greater to all employees.

Benefits

Payment of at least minimum wage can ensure that you are not subject to accusations of unfair payment of wages and, depending on national laws, may be a basic legal requirement. Minimum wages, as promoted by the International Labor Organization (ILO), are aimed at protecting workers who receive the lowest pay from "undue exploitation". Worker wellbeing is directly linked to productivity and low turnover and benefits the company.

Tips for implementation

More information on national minimum wages may be found on the corresponding government websites of each country.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

THE LIMIT OF MINIMUM WAGE

In many cases, the minimum level of compensation is not sufficient to ensure that workers and their families can meet basic living costs, including adequate food, housing, educational and other basic requirements.

Payment of wages above minimum wage (i.e. living wage) can help to ensure that workers can meet those basic needs and improve worker satisfaction leading to lower rates of turnover, sick leave, and higher product quality and productivity. (See Practice 5.2 for payment of a living wage).

5.2.

A LIVING WAGE LEVEL HAS BEEN ESTABLISHED AND IS PAID TO EMPLOYEES.

DESCRIPTION

The International Labor Organization (ILO) defines a living wage as a family wage, calculated based on take-home pay that ensures that workers and their families can live above the poverty level and participate in normal social and cultural activities. This sustainability practice involves first establishing a living wage level for your region and then ensuring this level of payment to all workers.

Implementation Cost

Variable cost. Costs related to the development of a living wage policy and establishment of appropriate wage level.

Maintenence Cost

Variable cost. Will depend on the difference between current and living wage levels.

Benefits

Though you may see paying higher wages only as a cost to employers in the short term, better-paid employees can yield benefits. Decreased turnover, reduced sick leave, higher productivity and more-motivated workers can result from a wage level that ensures well-being for workers and their families. Reputational risks are also reduced for employers when workers are paid a living wage.

Tips for implementation

Certain countries or regions have living wage levels developed by government or non-governmental organizations. You can consult these sources to establish a living wage in line with these guidelines. Alternatively, a living wage can be established for the local conditions, taking into account the methodological considerations outlined in the text box.

A LIVING WAGE LEVEL HAS BEEN ESTABLISHED AND IS PAID TO EMPLOYEES.

CALCULATING LIVING WAGE

While there is no standardized methodology for calculating a living wage, it must be based on:

- Time- and place-specific data.
- The cost of a nutritious, low-cost diet.
- The cost of housing, clothing and footwear.
- Other costs such as transportation, children's education, healthcare, recreation, etc.

A living wage is a family wage, and calculations must estimate the family size and number of workers per family considered appropriate for the context, or calculate for several household sizes. A living wage normally excludes overtime pay from the calculation, and includes guidelines on how to adjust the methodology for temporary or seasonal workers.

A recent ILO report stresses that the development of well-documented and defendable methodologies and estimates for living wages require resources and expertise, particularly in developing countries.

WHERE TO GET MORE INFORMATION

English:
http://www.ethicaltrade.org/issues/living-wage-workers/living-wage-resources
http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_162117.pdf
http://www.fairtrade.net/programmes/workers-rights.html#c9571
http://www.isealalliance.org/our-work/improving-effectiveness/global-living-wage-coalition

Spanish:
https://www.isealalliance.org/sites/default/files/LivingWageReportSpanish_DomRep.pdf
http://calculadorasalariodigno.trabajo.gob.ec/CalculadoraSalarioDigno/index.jsf

Portuguese:
http://www.isealalliance.org/sites/default/files/Living_Wage_Benchmark_Report_Brazil_Portuguese.pdf

5.3.

WORK BASED ON PRODUCTION (QUOTAS AND PIECEWORK) IS PAID AT LEAST AT A LEVEL PROPORTIONATE TO MINIMUM WAGE.

DESCRIPTION

If your packinghouse uses a payment system based on production (quotas or piecework), a system is in place to ensure that workers earn at least the minimum wage based on a manageable work load during normal working hours and under normal working conditions. Information about this pay rate is transparent and available for all workers

The system ensures that workers will earn a minimum wage without overtime hours, and that overtime hours are paid at the legally-mandated rate. (see Practice 5.5)

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to fair payment of work based on production.

Benefits

This practice can help your packinghouse avoid reputational risks by ensuring that piecework systems do not lead to undue exploitation of the workforce. Unfair piecework payment systems can force workers to extend their working hours to ensure wages sufficient to meet basic needs. A fair and transparent system ensures both legal compliance and improved conditions of employment. Competitive piecework rates may also lead to increases in productivity and decreased turnover.

Tips for implementation

- Make information on the system of payment for piecework available to all workers and explain it clearly at the commencement of employment (during orientation), including the system for recording production and any productivity requirements.
- Information on piecework rates may be communicated to workers by some or all of the following methods:
  - Post information on notice boards or at kiosks.
  - Provide detailed information on pay slips.
  - Communicate with workers during regular meetings.
- Adjust piecework rates according to changing conditions at the packinghouse.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

5.4.

DEDUCTIONS FROM SALARIES ARE ONLY PERMITTED IF STIPULATED BY NATIONAL LAWS AND/OR IF WRITTEN CONSENT IS GIVEN BY THE EMPLOYEE.

DESCRIPTION

Your packinghouse makes deductions from salary only as permitted by law. Any additional deductions are made with the written consent of the employee. You also ensure that deductions do not reduce wage levels below minimum wage, and are not employed as a form of financial disciplinary action.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the labor required to obtain written consent from workers for any deductions not stipulated by law.

Benefits

By implementing clear and fair policies on deductions, your packinghouse can avoid reputational risks, and comply with any related legal requirements. Exploitive and unfair working conditions, when highlighted by the media or watchdog organizations, can result in loss of markets, as a result of consumer concerns.

Tips for implementation

- Develop policies on deductions from salaries, in accordance with this practice.
- Inform workers of all deductions from their salaries, and the procedures allowing them to appeal in the event of perceived discrepancies.
- Ensure deposits are not taken for basic work equipment, such as personal protective equipment, and that deposits are not required as a condition of employment.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

5.5.

ALL OVERTIME IS VOLUNTARY, AND PAID AT A PREMIUM.

DESCRIPTION

Your packinghouse complies with national and local legislation and industry standards, and does not regularly require workers to work more than 48 hours per week or 10 hours per day.

If workers accept overtime hours, they do not work more than 60 hours per week, except under exceptional circumstances.
All overtime is voluntary and workers are aware that they will be at no disadvantage in the event they do not accept overtime hours. Overtime hours are recorded and paid at a premium, at least in accordance with national legislation.

Implementation Cost

No cost.

Maintenence Cost

Variable cost.
Costs related to appropriate payment of overtime hours.

Benefits

Proper implementation of this practice ensures that reputational risks are avoided and legal compliance is ensured. In addition, it also ensures that excess overtime hours do not lead to an increase in the accident rate at your packinghouse.

Tips for implementation

- Develop a policy on overtime hours for your packinghouse.
- Inform workers of your overtime policy when they are hired.
- Include information on payment of overtime in workers' pay slips (see Practice 5.7).
- Monitor health and safety statistics to ensure that overtime hours are not contributing to an increased accident rate.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

DID YOU KNOW?

Due to the seasonality of mango production, more than 60 hours of work per week may be acceptable for short periods of time, while ensuring that workers have at least one day of rest for every 6 days of work (see Practice 5.9). Workers' hours should not exceed 60 hours per week averaged over an 8-week period, or as stipulated by national legislation..

5.6.

FULL-TIME EMPLOYEES AND TEMPORARY WORKERS HAVE LEGALLY-BINDING CONTRACTS WITH YOUR PACKINGHOUSE, IN ACCORDANCE WITH NATIONAL LEGISLATION.

DESCRIPTION

Your packinghouse has written, legally-binding contracts with permanent and temporary workers, as required by national legislation. Workers receive copies of their written contracts.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to administration of contracts with employees.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

Benefits

A written contract clearly defines the relationship between employer and workers, and can contribute to creating a positive working atmosphere, by establishing the rights and obligations of both parties. Appropriate contracts with workers can help packinghouses avoid reputational risks related to unfair treatment of workers, and ensure legal compliance.

Tips for implementation

All worker contracts must be in accordance with local legislation. Legally-binding, written contracts should contain at least the following information:

- Job title and description.
- Working hours.
- Pay rate.
- Overtime regulations.
- Duration of employment.
- Social security benefits and deductions.
- Grievance procedures.
- Provisions on the termination of employment.

Alternatively, the contract may cover only basic information, such as position and wages, while additional information may be provided in a general document such as an employee handbook.

5.7.

PAYMENTS TO WORKERS ARE MADE AT REGULARLY SCHEDULED INTERVALS AND DOCUMENTED WITH A PAY SLIP.

DESCRIPTION

Your packinghouse pays all workers in full at regularly scheduled intervals in accordance with the law, and documents the payments with a pay slip containing all necessary information, presented in a manner understandable to workers.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Regular pay and the provision of an understandable pay slip are key elements to ensure a fair and transparent pay system. This leads to employee trust and dependable worker productivity.

Tips for implementation

- Clearly communicate the pay schedule and pay policies to all workers.
- Make payment directly to workers in legal tender (cash, check or direct deposit).
- Provide a pay slip with each payment, that clearly informs wages earned, bonuses, overtime payment, and a detailed list of deductions.
- Develop an appeal mechanism to address any perceived discrepancies in payment detected by workers.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

5.8.

MIGRANT, SEASONAL, AND TEMPORARY WORKERS ARE GRANTED THE SAME RIGHTS AND BENEFITS AS PERMANENT WORKERS.

DESCRIPTION

Migrant and seasonal/temporary workers receive the same rights, benefits and employment conditions as local and permanent workers, and equal wages for the same work performed. Where migrant and/or temporary/seasonal workers cannot receive the same benefits (e.g., pension schemes or social security), equivalent benefits are provided through alternative means.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the payment of equivalent benefits for all workers.

Benefits

Migrant, seasonal and temporary workers are often disadvantaged in terms of wages, housing and medical coverage. Developing and implementing specific policies can help ensure that your packinghouse avoids reputational risks related to exploitation of this type of worker, and safeguards the well-being of this important sector of the agricultural workforce.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

English:
http://www.iufdocuments.org/www/documents/migrantcharter-e.pdf

Spanish:
http://www.iufdocuments.org/www/documents/migrantcharter-es.pdf

5.9.

WORKERS ARE ALLOWED AT LEAST ONE DAY OF REST FOR EVERY 6 CONSECUTIVE DAYS WORKED.

DESCRIPTION

Your packinghouse allows workers 24 consecutive hours of rest for every 6 consecutive days worked (unless exceptional circumstances apply). Exceptional circumstances may include peak periods for the packinghouse.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Respecting days off is a requirement of national legislation in many countries and is an industry best practice. It will also contribute to maintaining worker trust and productivity.

Tips for implementation

In the event of exceptional circumstances, they must be agreed upon in writing by all workers, indicating the period of time for which they are applicable.

Offer the rest days lost during the period of exceptional circumstances to workers at the end of this period.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

6. WORKER HEALTH & SAFETY

WORKER HEALTH & SAFETY

Agricultural workers, including food packing and processing workers, are at the base of the food production system. They are also at the front lines in efforts to ensure efficient operations, food safety, and environmental protection.
A 2012 report by the Tellus Institute and Sustainalytics highlights the fact that the food industry generally is one of the most dangerous in terms of injury rates and fatalities. The use of heavy machinery, dangerous tools, repetitive lifting of heavy objects, as well as conditions of heat and cold in the workplace and standing for long hours are factors that can increase the rate of accidents and illnesses. Fostering a safe and healthy workplace is an important sustainability goal that involves adhering to occupational. health and safety regulations, and implementing safeguards in priority areas such as the handling of chemicals, equipment and machinery safety, and ventilation and lighting, among others

Well-trained employees, implementing adequate health and safety procedures, can not only reduce accidents and days lost, but also minimize the risks of unsafe operations with negative impacts that could affect the local environment and compromise food safety. Education and training of workers is key to making progress towards sustainable operations, as is providing workers with adequate equipment and procedures to maintain safe operations.

Implementing the following nine (9) practices will help you ensure worker health and safety at your packinghouse:

- 6.1. Legally-mandated social security is provided for all employees.
- 6.2. Access to appropriate medical services is ensured in the event of work-related illness or injury.
- 6.3. Standard Operating Procedures (SOPs) exist for workplace safety and accident prevention.
- 6.4. Employees are provided with appropriate Personal Protective Equipment (PPE).
- 6.5. At least one employee health and safety training meeting is conducted at the beginning of the season.
- 6.6. Safety statistics are tracked and analyzed.
- 6.7. Safety instructions regarding hazardous work are clearly displayed in the workplace.
- 6.8. All employees are provided with access to clean drinking water, clean toilets and hand-washing facilities.
- 6.9. Employees are provided with suitable areas where they can rest.

6.1.

LEGALLY-MANDATED SOCIAL SECURITY IS PROVIDED FOR ALL EMPLOYEES.

DESCRIPTION

Your packinghouse complies with all legal obligations to provide health insurance and/or social security benefits to all workers. Where these benefits are not available for temporary workers, your packinghouse ensures their access to comparable health services.

Implementation Cost

No cost.

Maintenence Cost

Variable cost. Costs related to the payment of legally-mandated health insurance and/or social security benefits.

Benefits

Providing legally-mandated worker benefits not only ensures compliance, but also protects your packinghouse against reputational risks related to unfair treatment of workers. Proper health insurance and social security benefits are also a basic requirement to ensure the well-being of the workforce, and may improve relations with workers, leading to fewer days off and higher levels of productivity.

WHERE TO GET MORE INFORMATION

Contact local labor authorities for further information.

6.2.

ACCESS TO APPROPRIATE MEDICAL SERVICES IS ENSURED IN THE EVENT OF WORK-RELATED ILLNESS OR INJURY.

DESCRIPTION

Your packinghouse ensures all workers have access to appropriate medical services during working hours in case of workplace injuries or illnesses. If your packinghouse is located far from a clinic, hospital or population center, transportation is provided for workers to access medical services or these services are provided by an on-site doctor or nurse.

Implementation Cost

Variable cost. Costs related to developing policy, and where applicable, hiring medical staff.

Maintenence Cost

Variable cost. Costs related to provision of healthcare services, which may be covered by government health insurance or social security.

Benefits

Providing access to medical services is an important obligation of agricultural employers, including packinghouses. In addition to safeguarding worker health and safety, this may be a basic legal requirement. This practice is directly related to worker well-being and will therefore also generate benefits for the company.

Tips for implementation

- Determine whether workers have access to these services through government healthcare coverage or as a result of legally-mandated health insurance or social security benefits.
- Where required, packinghouses may be legally obligated to contract on-site medical services.
- In addition to ensuring access to medical services, it is a good practice for packinghouses to provide first aid facilities, equipment and trained first aid staff to meet all reasonably foreseeable emergency first aid situations.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

6.3.

STANDARD OPERATING PROCEDURES (SOPS) EXIST FOR WORKPLACE SAFETY AND ACCIDENT PREVENTION.

DESCRIPTION

Packing-related risks have been identified for your packinghouse, and procedures have been developed to minimize or eliminate occupational risks for workers. Procedures are implemented systematically to ensure benefits in terms of accident-reduction.

Implementation Cost

Variable cost. Costs related to hiring of external consultant to assist in developing procedures and reviewing legal compliance (if required).

Maintenence Cost

No cost.

Benefits

Identifying risks and developing procedures that minimize the risk of accidents and injuries will improve worker health and the safety of packinghouse operations. This will reduce healthcare costs, lost time, and possible impacts on neighbors and local communities resulting from inappropriate practices at your packinghouse.

Tips for implementation

- Develop procedures and review to ensure compliance with national laws.
- Identify potential emergencies, and develop response plans so that impacts on workers and the community are minimized.
- Train workers on SOPs and maintain communication on this topic.
- Involve workers in reviewing procedures, and designate one employee to ensure compliance with procedures.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

6.4.

EMPLOYEES ARE PROVIDED WITH APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE).

DESCRIPTION

Your packinghouse provides all workers with appropriate personal protective equipment (PPE) in good condition and free of charge, for hazardous activities such as handling chemicals, repetitive heavy lifting or operating machinery. Workers are instructed and monitored in the proper use of PPE.

Implementation Cost

Medium cost. Costs related to purchasing the required PPE.

Maintenence Cost

Low cost. Costs related to the maintenance and renewal of PPE.

Benefits

Adequate PPE is necessary to protect employees from workplace hazards. When properly used and maintained, together with adequate safety training (see Practice 6.5), PPE can help packinghouses minimize workplace accidents.

Tips for implementation

The following list of questions can help you determine the PPE required at your packinghouse and guide its proper use:

- **What are the hazards?** Identify all potential hazards and determine the PPE required for each. These will likely include handling hazardous materials (sanitizers or other chemicals), as well as other hazardous activities related to lifting and/or operating heavy equipment, work at heights, etc.
- **What is the appropriate PPE for each type of hazard?** The necessary PPE may include: rubber boots or other appropriate footwear, protective overalls, rubber gloves, face masks, and ear and eye protection devices.
- **Are mechanisms in place to ensure that PPE is used at all times?** Provide training and incentives to ensure workers use PPE whenever undertaking hazardous activities. Monitor use of PPE by workers.
- **Is PPE appropriately cleaned and stored?** Ensure workers clean and store PPE onsite, and never take it home.
- **Is PPE properly maintained and renewed?** Inspect PPE regularly, and repair or replace damaged or worn out equipment.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

6.5.

AT LEAST ONE EMPLOYEE HEALTH AND SAFETY TRAINING MEETING IS CONDUCTED AT THE BEGINNING OF THE SEASON.

DESCRIPTION

Your packinghouse regularly trains workers on occupational health and safety, relevant health protection and first aid, at least once a year at the beginning of the season. Any newly hired or reassigned workers also receive this training. Records of training are kept, and appropriate educational materials are used (videos, manuals, diagrams, etc.).

Implementation Cost

Medium cost.
Costs related to the development of appropriate training materials and lesson plans.

Maintenence Cost

Low cost.
Costs related to instructor wages and maintaining records of training.

WHERE TO GET MORE INFORMATION

English:
http://farmsafewa.org/media/2912/40._Health_and_Safety_in_the_Packing_Shed.pdf
https://extension.tennessee.edu/publications/Documents/SP746-A.pdf

Benefits

Adequate health and safety training is an important area of risk management for any operation in the food industry. Promoting safe work practices through regular and appropriate training can reduce the accident rate by avoiding injuries and illnesses, minimizing healthcare costs and the number of lost days. It is a prerequisite to ensuring worker well-being, and properly trained workers will also be more productive.

Tips for implementation

- Topics covered by health and safety training will likely include:
  - Operating machinery and using tools.
  - Handling and disposal of chemicals.
  - First aid and emergency procedures.
  - Housekeeping.
  - Personal protective equipment.
- Maintain records of training sessions, including the topic, duration, materials used, trainer and workers in attendance.
- Make workers aware they have the right to remove themselves from unsafe situations without being penalized.
- It is best practice to designate a member of the packinghouse administration responsible for health and safety.

6.6.

SAFETY STATISTICS ARE TRACKED AND ANALYZED.

DESCRIPTION

Written records are kept of all occupational injuries, illnesses and deaths. Based on these records, safety statistics are analyzed, and corrective actions are taken when issues are detected.

Implementation Cost

Low cost.
Costs related to creation of tracking tool in easy-to-use format (such as Excel).

Maintenence Cost

Low cost.
Costs related to maintaining records of accidents and days lost.

Benefits

Maintaining records of work-related accidents and illnesses will assist your packinghouse to set safety goals and track success. Detailed records may also help to identify problem areas, and implement corrective actions to ensure greater worker health and safety.

Tips for implementation

- Designate a member of the medical staff (nurse, doctor) or other employee to maintain records of workers' illnesses, accidents, first aid healthcare and other healthcare provided, as well as days lost.
- Analyze the resulting safety statistics regularly to detect trends and set targets for accident reduction.
- It is best practice to take corrective action when hazardous areas or procedures are detected through the analysis of safety statistics.

SAFETY STATISTICS TOOL

Date of incident	Name of employee	Reason/explanation of incident	# days lost	First aid

6.7.

SAFETY INSTRUCTIONS REGARDING HAZARDOUS WORK ARE CLEARLY DISPLAYED IN THE WORKPLACE.

DESCRIPTION

Information, safety instructions, and hygiene recommendations for all hazardous activities are clearly displayed in the workplace, through signs in the language(s) understood by workers and with pictures.

Implementation Cost

Low cost.
Costs related to the creation of safety instructions and signage.

Maintenence Cost

Low cost.
Costs related to maintenance of signage.

Benefits

Health and safety risks related to hazardous work can be reduced through worker training, information, and appropriate procedures. Training and visible signage, using symbols and/or pictures, will help ensure workers are informed of hazards and related safety procedures, and reduce the risk of accidents.

Tips for implementation

- Identify hazardous activities and develop signage with symbols and/or pictures to communicate safety instructions.
- Train workers on safety instructions and hygiene recommendations (see Practice 6.5).
- Develop procedures indicating who oversees informing and monitoring adherence to safety instructions.

WHERE TO GET MORE INFORMATION

Consult local public health and labor authorities for further information.

6.8.

ALL EMPLOYEES ARE PROVIDED WITH ACCESS TO CLEAN DRINKING WATER, CLEAN TOILETS AND HANDWASHING FACILITIES.

DESCRIPTION

Access to clean, safe drinking water that complies with national standards is provided to all workers. Your packinghouse has a sufficient number of toilets, they are maintained clean, and toilet paper is provided and disposed of properly. Employees are instructed to wash their hands before handling mangos or entering the work area, as well as after eating, using toilets or taking a break, or anytime when hands have potentially been contaminated.

Implementation Cost

Variable cost.
Costs related to possible upgrading or new construction of toilets and handwashing facilities.

Maintenence Cost

Low cost.
Costs related to provision of drinking water and maintenance of facilities.

Benefits

Access to clean water will reduce the risk of heat-related illness for workers, and can help maintain worker productivity. As well as being a basic requirement for employees, clean toilets and handwashing facilities are essential to food safety, particularly to the prevention of biological contaminants.

Tips for implementation

- Use visible signage to remind employees to wash their hands before handling mangos or entering work areas.
- Adequate hand-washing facilities for workers require running water, soap, and paper towels. Hand sanitizer may also be provided.

WHERE TO GET MORE INFORMATION

English:
http://mangofoodsafety.org/english/Packinghouse/Mango_FSTK/FSTK_Packinghouse.pdf
https://www.osha.gov/SLTC/heatillness/index.html
https://www.epa.gov/pesticide-worker-safety/preventing-heat-stress-agriculture

Spanish:
Kit de capacitación en inocuidad de los alimentos para la industria del mango (Mango-FSTK) - http://mangofoodsafety.org/espanol/Empacadora/Mango_FSTK/Manual_Empacadora.pdf
https://www.osha.gov/SLTC/heatillness/

6.9.

EMPLOYEES ARE PROVIDED WITH SUITABLE AREAS WHERE THEY CAN REST.

DESCRIPTION

Your packinghouse provides workers with suitable areas where they can rest during breaks and meal times. A canteen with cooking facilities is provided if requested by workers. Rest areas and canteens are maintained clean at all times.

Implementation Cost

Variable cost.
May require building or adapting areas at your packinghouse.

Maintenence Cost

Low cost.
Costs related to general maintenance and cleaning.

Benefits

By providing workers with rest areas where personal items can be stored, as well as canteens where applicable, packinghouses can avoid contamination of mangos by workers' food or personal items, thus ensuring food safety.

Tips for implementation

- Provide a clean area, physically separated from packing, where workers can leave their personal items.
- Canteens may not be necessary or appropriate for small packinghouses.
- When provided, ensure canteens have clean and adequate cooking facilities.

7. OTHER WORKER BENEFITS

OTHER WORKER BENEFITS

Fair treatment of workers by companies is a basic principle of sustainable operations. Fostering good relations with workers, enhancing productivity, decreasing turnover, and minimizing reputational risks are some of the benefits of adopting this principle. This is especially relevant in food packing facilities, given the abuses often highlighted in media reports and studies by consumer and human rights organizations.

Customer and consumer perception of labor management can lead to product boycotts. A recent report published by SEDEX Global highlighted such risks, identifying labor management as one of the major risks for Latin America's supply chains, together with the ability of companies to ensure that internal systems are in place to meet local and international compliance standards for labor.

When effective and properly documented systems are in place, the rights and fair treatment of workers can be guaranteed. In addition, they can help you gain access to certifications and product streams that pay a premium price, such as fair trade.

The following eight (8) practices are designed to ensure labor rights are respected and workers are treated with dignity.

- 7.1. If housing for permanent or temporary workers is provided, it is well-designed and maintained to foster good health and safety conditions.
- 7.2. An orientation program is provided for new employees.
- 7.3. A "non-discrimination policy" has been established and is enforced.
- 7.4. A grievance procedure has been established and is effectively implemented.
- 7.5. Lunch and rest breaks are granted and respected.
- 7.6. A minimum age policy has been established and is enforced.
- 7.7. Workers' freedom of association and their right to organize are recognized.
- 7.8. All employment is freely chosen.

7.1.

IF HOUSING FOR PERMANENT OR TEMPORARY WORKERS IS PROVIDED, IT IS WELL-DESIGNED AND MAINTAINED TO FOSTER GOOD HEALTH AND SAFETY CONDITIONS.

DESCRIPTION

If your packinghouse provides housing for permanent, migrant or other temporary workers, the housing and community facilities are well-designed (see below), built, maintained and/or improved to ensure good hygienic, health and safety conditions, and a decent living environment.

Workers are granted the freedom to choose whether they want to live in the housing you provide.

Implementation Cost

Variable cost.
Costs related to possible investment in upgrading of housing.

Maintenence Cost

Medium cost.
Costs related to maintenance of housing and community facilities.

Benefits

Studies of agricultural workers by the International Labour Organization (ILO) note the close link between worker housing, well-being and productivity. Poor housing conditions can lead to the spread of communicable diseases, and inadequate sanitary conditions can expose workers to waterborne diseases. If worker well-being is supported through access to basic sanitation and hygiene, workers are also more likely to maximize productivity while ensuring food safety.

IF HOUSING FOR PERMANENT OR TEMPORARY WORKERS IS PROVIDED, IT IS WELL-DESIGNED AND MAINTAINED TO FOSTER GOOD HEALTH AND SAFETY CONDITIONS.

Tips for implementation

According to ILO Convention 115 on worker housing, employer-provided housing should ensure, "structural safety and reasonable levels of decency, hygiene and comfort". To this end, the following are some of the key characteristics required for the housing:

- Compliance with national and regional legislation.
- Sufficient space and clean, sanitary mattresses.
- Adequate natural light during the day and sufficient artificial lighting.
- Proper ventilation in all weather conditions.
- Adequate supply of safe potable water.
- Sufficient and hygienic sanitary facilities. Where communal, provision of separate sanitary facilities for men and women.
- Adequate drainage.
- Sufficient laundry facilities.
- Regular inspection and upkeep of housing and community facilities.
- Fire safety measures and safe electrical installations.

ILO guidelines set out the following additional recommendations for employer-provided housing:

- Housing is provided only in cases where the work site is distant from population centers or where working conditions require workers to be available at short notice.
- Where possible, the ILO recommends assisting workers to find housing independently, to increase their integration with local communities and reduce dependence on the employer.
- If rent is charged, it is in accordance with local averages and does not exceed a reasonable proportion of worker income.
- Workers have the right to invite guests to their employer-provided housing.
- Workers have access to public and private transportation facilities, and are within easy reach of places of employment, and in close proximity to community

WHERE TO GET MORE INFORMATION

English:
ILO Helpdesk Factsheet No. 6, 2009 on housing
http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_116344.pdf

Spanish:
OIT Helpdesk Hoja informativa No. 6, 2009 sobre vivienda
http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_142785.pdf

7.2.

AN ORIENTATION PROGRAM IS PROVIDED FOR NEW EMPLOYEES.

DESCRIPTION

Your packinghouse provides an orientation program for new employees that includes a manual of company policies, job expectations, and terms of employment. These documents may be contained in an employee handbook. The orientation program includes an overview of your packinghouse's operations and sustainability policies and practices.

Implementation Cost

Low cost.
Costs related to developing the orientation program and employee handbook.

Maintenence Cost

Low cost.
Costs related to the time dedicated to implementation of orientation program.

Benefits

Orientation for new workers will help them to become more comfortable in the workplace and may, therefore, lead to earlier and higher productivity. A written orientation plan will increase efficiency and ensure all new workers receive the same information.

Tips for implementation

It is common for new employee orientation programs to include some or all of the content listed below:

- Review of company mission, vision, and values.
- Review of company work standards and discipline issues (e.g., tardiness, dress, timekeeping procedures).
- Overview of wages and benefits.
- Review of specific company policies (e.g., non-discrimination policy, overtime policies, etc.).
- Review of company sustainability policies and procedures.
- Signing required documents (e.g., employment contract, receipt of employee handbook, etc.).

Note: Employee orientation should occur ideally on the first day of work or at least within the first week of employment.

WHERE TO GET MORE INFORMATION

English:
https://www.extension.iastate.edu/AgDM/wholefarm/html/c1-78.html

7.3.

A NON-DISCRIMINATION POLICY HAS BEEN ESTABLISHED AND IS ENFORCED.

DESCRIPTION

Your packinghouse has established and implemented a written policy prohibiting discrimination in hiring, promotions, access to training, compensation, allocation of work, termination of employment, or treatment of employees in the workplace generally, along the lines of race, color, gender, age, religion, social class, political tendencies, nationality, syndicate membership, sexual orientation, marital status or any other motive. This policy is effectively communicated to all employees, who receive training on its implementation.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the training of managers and workers.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

English:
http://www.equitablefood.org/single-post/2016/03/28/A-harassmentfree-workplace-is-a-human-right

Benefits

A workplace non-discrimination policy, while establishing the basis for equitable treatment, ensures that your packinghouse complies with relevant national legislation, and reduces liability related to claims of discrimination from workers or clients. Related reputational risks may also be averted with a properly elaborated and implemented policy.

Tips for implementation

Development and implementation of the non-discrimination policy includes:

- Review of relevant national legislation to ensure compliance.
- Development of policies and procedures to ensure equal treatment in hiring, promotions, access to training, compensation, allocation of work, and termination of employment. The policy should also include zero tolerance for sexual harassment in the workplace, applicable to both management and workers.
- Training of managers, supervisors and/or workers on the principles of non-discrimination, and the promotion of a harassment-free workplace.
- Presentation of the policy as part of the orientation program.
- Awareness training for all workers on non-discrimination and sexual harassment.

7.4.

A GRIEVANCE PROCEDURE HAS BEEN ESTABLISHED AND IS EFFECTIVELY IMPLEMENTED.

DESCRIPTION

A written grievance policy, and related procedures, determines how workers' grievances and concerns are handled at your packinghouse.

Implementation Cost

No cost.

Maintenence Cost

Low cost.
Costs related to the resolution of grievances presented by employees.

Benefits

A grievance procedure not only ensures compliance with national legislation, but may also allow companies to save time and money by identifying and resolving workplace issues, and building an atmosphere of openness and trust. Addressing worker concerns in a fair and timely manner can also increase worker satisfaction.

Tips for implementation

Implementation of a grievance policy will likely include:

- Designating a person responsible for handling worker grievances.
- Making all employees aware of the policy and procedures upon hiring.
- Investigating issues raised via the grievance procedure and communicating the results to the worker who presented the concern.
- Ensuring that repercussions are not taken against workers who report grievances, and where possible, that the identity of the worker is protected.

Grievances may be reported directly or anonymously. Options for allowing workers to report grievances anonymously include:

- A suggestion box.
- An anonymous phone line.

Packinghouses can also encourage worker feedback, for example, by scheduling meetings with workers to discuss their concerns.

7.5.

LUNCH AND REST BREAKS ARE GRANTED AND RESPECTED.

DESCRIPTION

Your packinghouse ensures workers receive a 30-minute paid lunch break, as well as 15-minute paid rest breaks for every four hours worked, or as specified in national legislation.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Regular breaks are associated with reduced stress, and increased productivity. Lunch and rest breaks are also mandated by law in many countries.

Tips for implementation

To ensure proper implementation of lunch and rest break policies:

- Inform all workers they are entitled to these breaks.
- Where workers are paid by quota or piecework, ensure the quotas allow sufficient time for workers to reasonably take rest breaks.
- It is best practice to allow rest breaks to be spread out through the day.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

7.6.

A MINIMUM AGE POLICY HAS BEEN ESTABLISHED AND IS ENFORCED.

DESCRIPTION

Your packinghouse has a written minimum age policy prohibiting children under 15 years of age from working at the packinghouse, and has procedures to ensure that children under 18 years do not engage in any type of hazardous work.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

It is important that children's education not be hindered and that they are protected from health and safety risks in the workplace. Developing and implementing a clear minimum age policy will ensure your packinghouse complies with national legislation and international standards, and will help avoid the risk of reputation damage for exploitative child labor.

Tips for implementation

- Develop a written policy to ensure that child workers are not employed at your packinghouse. This covers workers under 15 years of age.
- Communicate the policy to all workers during orientation.
- If child workers are currently employed at your packinghouse, develop a responsible procedure to phase-out child labor as soon as possible.
- Develop a system to check the ages of all workers at your packinghouse, especially on hiring, and maintain records with appropriate documentation.
- Ensure that all local legal requirements are met for workers under 18 years, particularly:
  - Workers under 18 are prohibited from undertaking hazardous work (e.g., handling chemicals, work at dangerous heights or operating machinery) and working at night.

WHERE TO GET MORE INFORMATION

Consult local labor authorities for further information.

English:
http://www.ilo.org/ipec/areas/Agriculture/lang--en/index.htm

Spanish:
http://www.ilo.org/ipec/areas/Agriculture/lang--es/index.htm

7.7.

WORKERS' FREEDOM OF ASSOCIATION AND THEIR RIGHT TO ORGANIZE ARE RECOGNIZED.

DESCRIPTION

Your packinghouse ensures that the rights of workers to organize freely and negotiate collectively are respected as established in Conventions 87 and 98 of the International Labour Organization (ILO). Your packinghouse makes workers aware of this policy.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Recognition of your workers' rights ensures the legal compliance of your packinghouse and avoids possible reputational risks associated with unfair treatment of workers.

WHERE TO GET MORE INFORMATION

English:

ILO Convention 87, Freedom of Association and Protection of the Right to Organise Convention:
http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::p12100_instrument_id:312232

ILO Convention 98, Right to Organise and Collective Bargaining Convention:
http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312243:NO

Spanish:

Convenio 87 de la OIT, relativo al libertad sindical y a la protección al derecho sindical:
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312232,es:NO

Convenio 98 de la OIT, relativo al derecho de sindicación y de negociación colectiva:
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312243,es:NO

7.8.

ALL EMPLOYMENT IS FREELY CHOSEN.

DESCRIPTION

Your packinghouse has a written policy prohibiting forced or compulsory labor, including bonded or involuntary prison labor. All work at your packing facility is conducted on a voluntary basis, and not under threat or menace of penalty. This policy is communicated to your workforce.

Implementation Cost

No cost.

Maintenence Cost

No cost.

Benefits

Forced labor, often referred to by the media and human rights organizations as modern-day forms of slavery, represents a serious reputational risk for individual facilities and the industry in general. A clear policy prohibiting forced labor, that is effectively communicated and enforced, will avoid these risks and help ensure legal compliance and the fair treatment of workers.

FORCED LABOR

The International Labour Organization (ILO) defines forced labor as "situations in which persons are coerced to work through the use of violence or intimidation, or by more subtle means such as accumulated debt, retention of identity papers or threats of denunciation to immigration authorities."

This means that forced labor includes the following actions:

- Retention of salaries, benefits, property or documents.
- Requiring financial deposits or guarantees to maintain employment.
- Physical or psychological measures to force workers to remain in your employment.
- Unreasonable notice periods to terminate employment.
- Compelling spouses or children of workers to work at your packing facility.

Source: ILO

WHERE TO GET MORE INFORMATION

English:

ILO, Forced Labour Convention
http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C029

ILO, Abolition of Forced Labour Convention
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_ILO_CODE:C105

Spanish:

OIT, Convenio sobre el trabajo forzoso
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312174,es:NO

OIT, Convenio sobre la abolición del trabajo forzoso
http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_INSTRUMENT_ID,P12100_LANG_CODE:312250,es:NO