Occupational Safety and Health (OSH) Guidelines for the Tea and Cardamom Plantation and Processing Sector of Nepal

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Prepared By:

Federation of Nepalese Chambers of Commerce and Industries (FNCCI)

August 2024

Message from FNCCI President

The health and safety of people working in any business,enterprise, association, agriculture or construction sector is of particular importance and the task of protecting them during their work is occupational safety and health. Today, occupational safety and health is recognized as an integral element of public health, emphasizing the need for enterprises to align with establishedworkplace standards to safeguard worker well-being and promote a productive environment.

Apart from an unexpected pandemic like COVID-19, the nature of work and the conditions of the workplace without proper arrangements for the safety and health of the workers will definitely affect productivity. In this context, the Occupational Safety and Health (OSH)Guidelines for the Tea and CardamomPlantation and Processing Sector of Nepal, published by FNCCI, holds significant relevance as it comprehensively encompasses national and international laws, regulations, and standards pertaining to occupational safety and health. This guide serves as a critical resource for enterprises striving to ensure the effective management of occupational safety and health. I am confident that this publication will prove to be both invaluable and exemplary, as it delineates the responsibilities of all stakeholders—government bodies, private sector organizations, entrepreneurs, and workers—in the implementation and delivery of occupational safety and health measures.I would like to extend my heartfelt gratitude to the International Labour Organization Nepal Office and its esteemed Country Director, Mr. Numan Ozcan, for their invaluable support to the Federation of Nepalese Chambers of Commerce and Industry in the development of this significant guide. My sincere appreciation also goes to Ms. Jyotsna Shrestha Subba, Vice President and Chair of the FNCCI Employers' Council, as well as to Director General Mr. Gokarna Raj Awasthi and the Vice Presidents of the Employers' Council, Mr. Babu Kaji Karki and Mr. AranikoRajbhandari, for their exceptional contributions and dedication to this initiative.

Chandra Prasad Dhakal
President

Acknowledgment

The subject of occupational safety and health has long been a cornerstone of global discourse, particularly since the establishment of international laws advocating the rights and interests of workers. In Nepal, this critical area gained formal recognition in 2028 BS (1971 AD) with the creation of the Labor Department under the Ministry of Industry. The undeniable correlation between workplace conditions and employee safety, health, and product quality underscores the need for informed and proactive approaches in every enterprise. Managers and workers alike deserve access to clear information about potential risks and their consequences in the workplace, fostering a collective commitment to safe and healthy working environments. Acknowledging the critical importance of this issue, enterprises are increasingly prioritizing the enhancement of workplace safety and health standards.

Recognizing this imperative, the Federation of Nepalese Chambers of Commerce and Industry (FNCCI) has consistently championed initiatives to advance occupational safety and health (OSH) standards. Through the development of informational resources and implementation of diverse programs, FNCCI has worked tirelessly to promote OSH awareness and practices across various sectors. Building upon these efforts, I am very happy that FNCCI now presents the Occupational Safety and Health (OSH)Guidelines for the Tea and CardamomPlantation and Processing Sector of Nepal. This specialized guide serves as a benchmark for enhancing safety standards in these special industries such as tea and cardamom plantations, aiming to mitigate workplace risks and foster sustainable and secure working environments in Nepal's agriculture sector. I hope that this guide will help to reduce business risks and create a safe, healthy and sustainable working environment for everyone in the agriculture (tea and cardamom) sector.

I extend my heartfelt gratitude to Mr. Numan Ozcan, Country Director of the International Labour Organization (ILO) Nepal Office, and National Program Coordinator Ms. Bandana Aryal, for their invaluable support in developing this guide. I also wish to acknowledge and thank Mr. Dinesh Prasad Sah, a business safety and health expert, for his steadfast assistance and for developing this comprehensive guide. Furthermore, I express my sincere appreciation to the Assistant Director and Project Coordinator for the Safety and Health for Allproject, Mr. Hari Paudel; Project Finance and Administration Officer, Ms. Samyukta Bhandari; and the FNCCI Secretariat for their tireless efforts in preparing and publishing this significant guide.

Ms. Jyotsana Shrestha
Vice President and Chair
FNCCI, Employers' Council

Preface

This document provides crucial guidance to the Tea and Cardamom plantation sector in Nepal including its various stakeholders. It addresses the current perspectives on Occupational Safety and Health (OSH) guidelines specific to the plantation sector.

The purpose of these guideline is to assist the sector and its stakeholders in understanding and implementing critical safety standards and addressing operational safety concerns. By adhering to this guideline, stakeholders can ensure the maintenance of safe practices across all areas their work and prioritizing the health and safety of workers. Our aim is to minimize occupational risks and foster a safer, healthier, and more sustainable working environment for everyone involved in the plantation sector.

We hope this document will serve as important and valuable resource in promoting best practices and safeguarding the wellbeing of all involved in the Tea and Cardamom plantation of Nepal.

Abbreviation

CTC	Crush, Tear, and Curl
dBA	Decibel A-weighted
FNCCI	Federation of Nepalese Chambers of Commerce and Industry
GON	Government of Nepal
ILO	International Labour Organization
kg	Kilogram
MSD	Musculoskeletal Disorder
OSH	Occupational Safety and Health
PF	Provident Fund
PPE	Personal Protective Equipment

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1. Introduction

1.1. Background

The plantation sector in Nepal, encompassing tea, coffee, cardamom, and other crops, is a significant contributor to the country's economy. Nepal's tea industry is one of the oldest and largest export-oriented sectors[1]. However, the nature of work in plantations often involves risks and challenges that can compromise the safety and well-being of workers. Majority of workers in this sector operate within small-scale enterprises, with many being self-employed especially in cardamom sector. This is often overlooked by national OSH programs, despite the diverse and significant occupational risks they face.

Workers in plantations are exposed to harsh weather conditions, difficult terrains, and physically demanding tasks such as pruning, harvesting, and carrying heavy loads. These factors increase the risk of injuries and health issues. The use of pesticides and fertilizers can lead to chemical exposure, causing acute or chronic health problems for workers if not managed properly. Similarly, workers may encounter insects, and plants that pose health risks. Many plantation workers lack proper information about health and safety and are less educated, making them less likely to understand unsafe conditions. There is often a low level of awareness among workers about their rights and the safety practices that can protect their health and safety.

Developing sector-specific Occupational Safety and Health (OSH) guidelines for Nepal's plantation sector represents a significant development in the country's effort to enhance worker safety and well-being. Despite the Nepal Labor Act 2074 and the National Occupational Safety and Health Policy 2076 emphasizing shared responsibilities among employers, workers, manufacturers, importers, and suppliers to maintain safe workplaces, there remains an ongoing concern regarding the comprehensive protection and welfare of workers.

Addressing the unique risks associated with plantation work through tailored guidelines is crucial. The Federation of Nepalese Chambers of Commerce and Industry (FNCCI), in collaboration with ILO Nepal and the S+H for All project, is working for the development of these plantation sectoral guidelines for tea and cardamom plantations. This initiative not only aligns with the national policy framework but also caters to the specific needs of plantation workers, fostering a safer, healthier, and more dignified working environment. By focusing on the distinct challenges of the plantation sector, these guidelines will enhance the overall effectiveness of Nepal's OSH initiatives, reducing accidents, preventing occupational diseases, and promoting a culture of safety and health in one of the country's vital industries. Nepal is a member of the International Labour Organization

[1] "It's a hard life for low-wage Nepali tea workers", The Kathmandu Post, 30 November 2022.

(ILO) and has ratified various conventions related to labor rights and safety, this guidelines will greatly help in fulfilling the commitment to occupational safety and health.

1.2. Purpose and Scope of the Guidelines

This document provides guidance to the plantation industry (Tea and Cardamom) and various stakeholders in Nepal, including worker unions, health and safety regulators, local bodies on the current perspectives for defining Occupational Safety and Health (OSH) guidelines.

Its purpose is to assist the industry and stakeholders in understanding the critical safety standards and concerns that affect operational activities in the plantation sector. The OSH guideline is designed to aid in maintaining safe practices across all aspects of their work, prioritizing the health and safety of workers. The guideline aim to minimize occupational risks and promote a safer, healthier, and more sustainable working environment for all involved in the plantation sector.

2. Legislation Concerning OSH

Although there is no separate law related to occupational safety and health, the Labor Act 2017, Labor Regulations 2018, National Occupational Safety and Health Policy 2019 have provided legal and policy arrangements related to occupational safety and health. The prevailing labor laws, rules and policies of Nepal include the provisions of the International Labor Organization's Occupational Safety and Health Conventions-C155 and -C187.

The guideline is formulated based on national legislation, the International Labour Organization (ILO) conventions, and international best practices in Occupational Safety and Health (OSH) integrating legal requirements, global standards, and proven measures to ensure comprehensive and effective safety management in the cardamom and tea sectors.

National occupational safety and health laws and ILO conventions

- Labour Act, 2017
- Labour Rules, 2018
- National Occupational Safety and Health Policy, 2019
- C155 - Occupational Safety and Health Convention, 1981 (No. 155)
- C187 - Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)

3. Plantation Sector

This chapter details the production processes of tea and cardamom which helps in thorough understanding and identifying hazards and risks associated with each activity in these sectors.

3.1. Tea

Tea cultivation in Nepal started in 1863 A.D.[2] and out the 77 districts, 28 districts produce tea.[3] Tea is grown in two significantly different agro-climatic regions, in the plains (terai) and the hills.

Two types of tea are produced, CTC (Crush, Tear, and Curl) tea in plain region and Orthodox tea in hilly region. [4] CTC are 'curled leaf' tea that gives strong liquor with low degree of aroma and orthodox tea are loose leaf tea that has a good aroma and gives mild liquor.

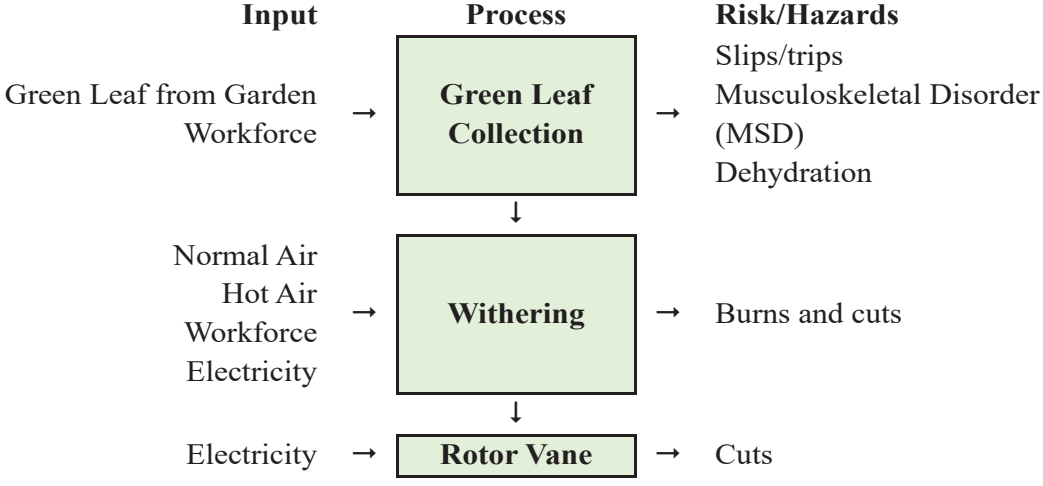
CTC Tea

To make CTC, fresh, whole leaves are fed into the CTC tea machines, which cut, tear and curl and process them. The resultant tea is an even output of small brown pellets. [5]

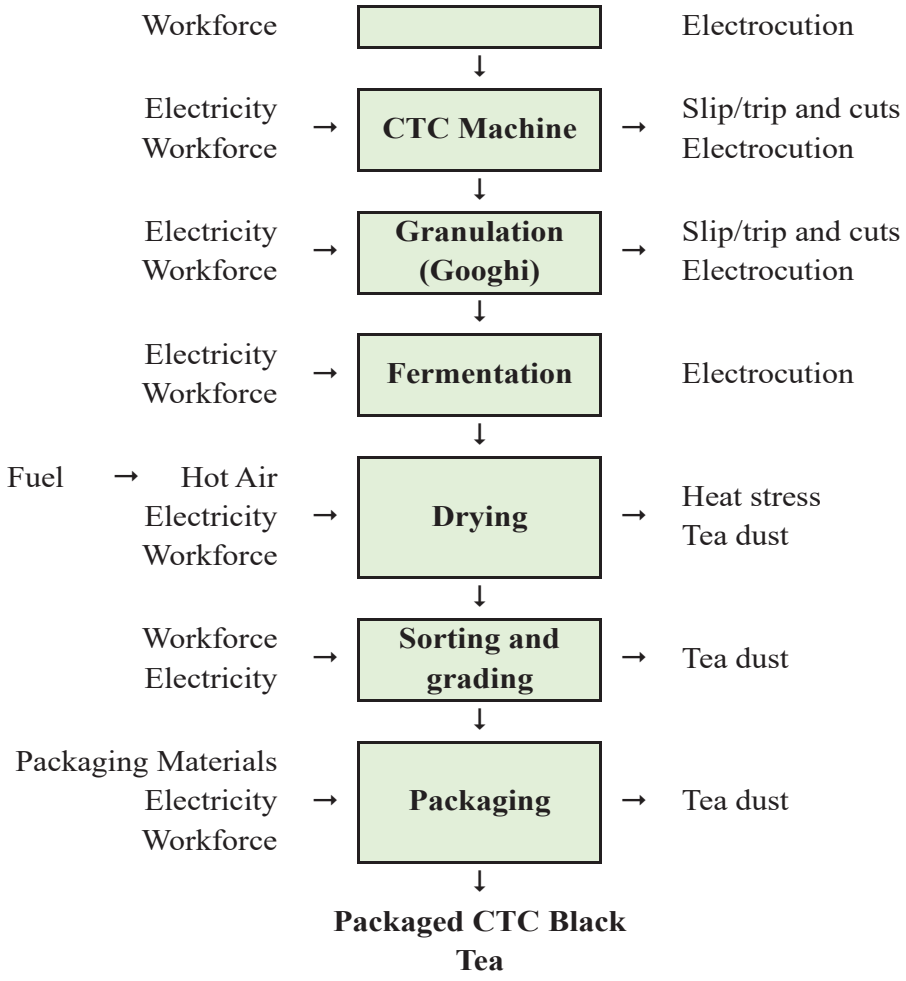
CTC Tea Production Process

The production flow chart of CTC tea is presented below:

Figure 3.1.1: Process Flow Chart of CTC Tea



[2] National Tea and Coffee Development Board, "History".
[3] Nepal, Ministry of Agriculture and Livestock Development, Statistical Information on Nepalese Agriculture 2076/77 (2019/2020) –Report, 2021.
[4] Mishra N. R., "Status of Tea Industry in South Asia and the Potential and Challenges of Nepal's Tea Production and Trade" *Journal of Korean Society of International Agriculture* 26, No. 1 (2014), 11-19.
[5] Teabox, "Difference between Orthodox vs CTC Teas: Production Process & Flavor".



Description of Production Process

The production process has been presented on literature review and experience from the sector.

Withering

In this process, tea leaf is induced to loose moisture substantially. Normally this step is carried out by spreading leaves thinly on troughs giving warm air, circulated by fans.[6] [7]

Crushing Tearing Curling (CTC)

When a satisfactory withering has been obtained, the leaf becomes ready for rolling, which twists the leaf, breaks it up and expresses the juices. The CTC process of rolling is

[6] Upasi Tea Research Foundation, "CTC".
[7] Teaclass, "How is Tea Made?"

a comparatively rigorous forcing leaves through a machine having two steel cylinders. The leaf as it passes consecutively through a bank of three to four such machines get much reduced in size. During this process, its cell gets ruptured accelerating the process for intensive fermentation. The whole process turns the tea leaf into granulated one.[8]

Fermentation

Normally the tea ferments or oxidizes between 60 to 100 minutes depending upon the leaf quality and climatic condition. Temperature and humidity plays significant role in tea fermentation. Temperature and humidity in the plain areas of Nepal is supportive for natural fermentation. Moreover, cool humid condition is essential for fermentation to allow larger retention time for the production of black, grainy and heavier tea. [9]

Drying

The next process of tea production is drying. The objectives of drying is to arrest fermentation, and remove moisture thereby producing good quality tea. The mass of leaf is exposed to hot air after it passes through a chamber with perforated moving trays. The air blowing through the chamber is maintained at temperatures between 100 to 130 degrees centigrade as its base range. It takes 30 to 40 minutes to dry the leaf, after the enzymes are fully activated. After completion of the drying process, the tea turns completely into a black color. [86]

Sorting and Grading

Sorting is the operation in which tea particles of the bulk are separated into various grades of different sizes according to the to trade requirements. The process of sorting has two objectives; enhance the value and impart quality.

Storage and Packaging

Tea is markedly hygroscopic material, in the process of cooling and sorting, it absorbs moisture. Before packing tea, the accumulated series of daily batches of each grade are bulked and mixed to obtain the highest possible degree of unity. Before packing tea, there has been a provision to pass under powerful magnets to prevent any possibility of mixing of pieces of iron with the tea. Then the tea is packed.

Orthodox Tea

Orthodox tea is produced using traditional (orthodox) methods. In orthodox processing, every batch of plucked leaves is treated to a precise amount of withering, rolling, and

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[8] Sarkar, Satyajit et. al., "Major Tea processing practices in India", *International Journal of Bioassays*, 5, No. 11(2016), 5071-5083.

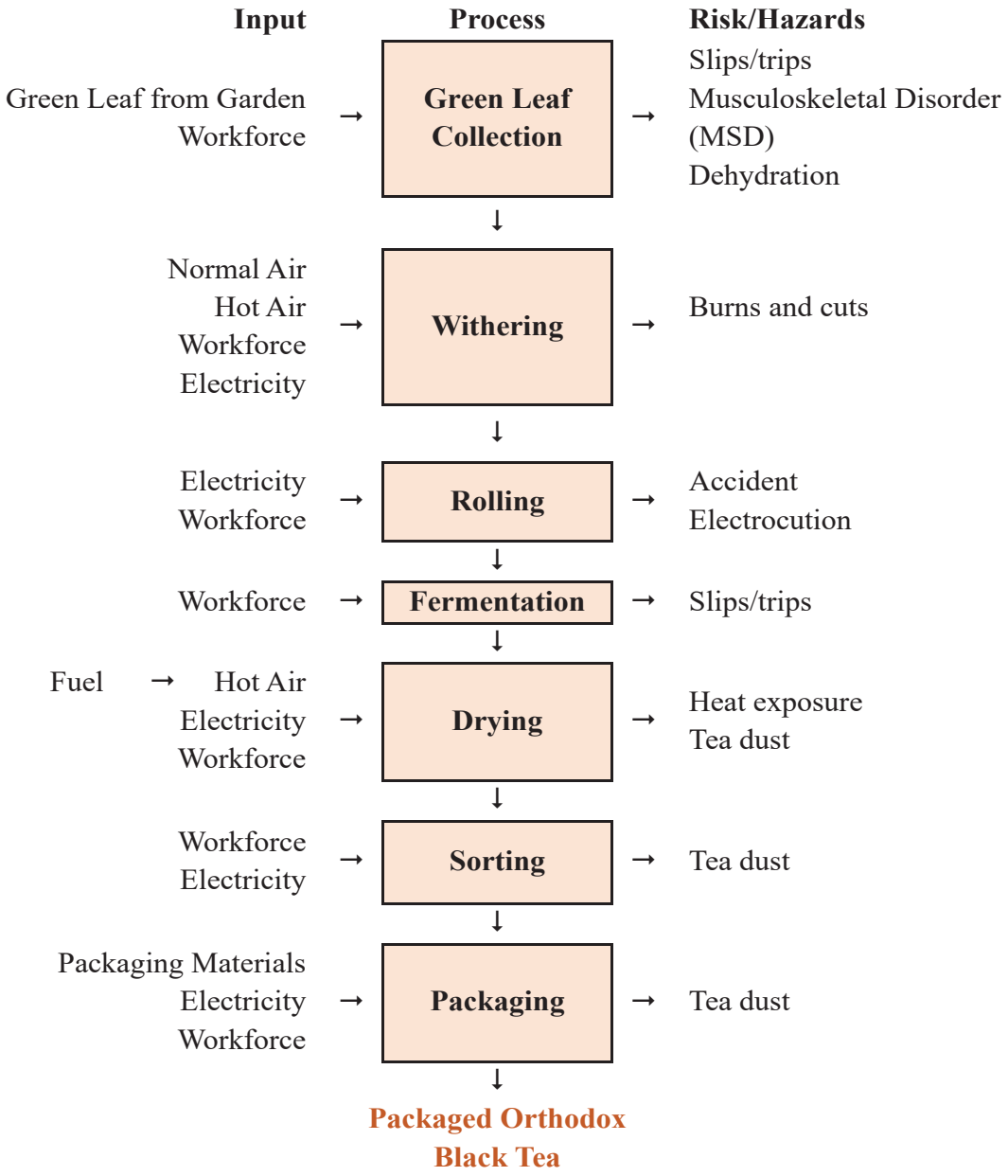
[9] Nagalakshmi, D., Sastry, V.R.B. & Pawde, A. (2003). Rumen fermentation patterns and nutrient digestion in lambs fed cottonseed meal supplemental diets. Animal Feed Science and Technology, 103, 1–4.

oxidation determined by trained tea professionals to extract the best flavors from the leaves.[88]

Orthodox Tea Production Process

The production flow chart of Orthodox tea is presented below:

Figure 3.1.2: Process Flow Chart of Orthodox Tea



Description of Production Process:

The production process is based on literature review and experience from the sector.

Withering

The green leaves are collected and spread over the withering troughs where the moisture is removed from the fresh green leaves by passing air through the leaves. The air that is supplied to the trough is around 30 to 33°C depending of the ambient condition. The leaves are left in the weathering trough for about 8 to 12 hours or more until approximately 70 percent moisture is removed. [7]

Rolling

After attaining this 70 percent mark, the leaves are sent to the rolling machines. In the rolling machine, the leaves are rolled for about 70 to 80 minutes at different pressures. The rolling machine rolls the leaves thereby releasing the juices from the leaves. After rolling, the leaves are shifted. The shifting separates the leaves into two categorizes; fines and coarse.

Fermenting

These fine and coarse leaves are then placed on fermenting trays for the fermentation process. The fermentation is actually oxidation because during this process the juices released from the rolling reacts with the air (oxygen) to create the flavor of the tea. Fermentation is carried out for about 2 to 3 hours. It must be noted that the total fermentation time begins from the starting of rolling, so the actual time the leaves are left on the fermenting tray may be as long as 3 hours.[78]

Drying

After fermentation, the leaves are sent to the drier. The drying time ranges from 20 to 25 minute depending on the ambient condition and the amount of fermentation that has occurred. The leaves are dried in different batches of fine and coarse separated as in fermentation. Wood, coal, briquette are used as fuel in dryer.

Sorting

The dried leaves are then sent for sorting where they are sorted into final grades. The coarse leaves will be sorted into SFTGFOP (Super Fine Tippy Golden Flowery Orange Pekoe) and FTGFOP (Fine Tippy Golden Flowery Orange Pekoe) and into the other lower grades. The fine leaves are sorted into TGBOP (Tippy Golden Flowery Orange Pekoe) and lower grades. Once the leaves are sorted and graded, they are packed, ready for shipment.[10]

[10] Nepal Dream Tea, "*The Culture of the Tea".*

3.2. Cardamom

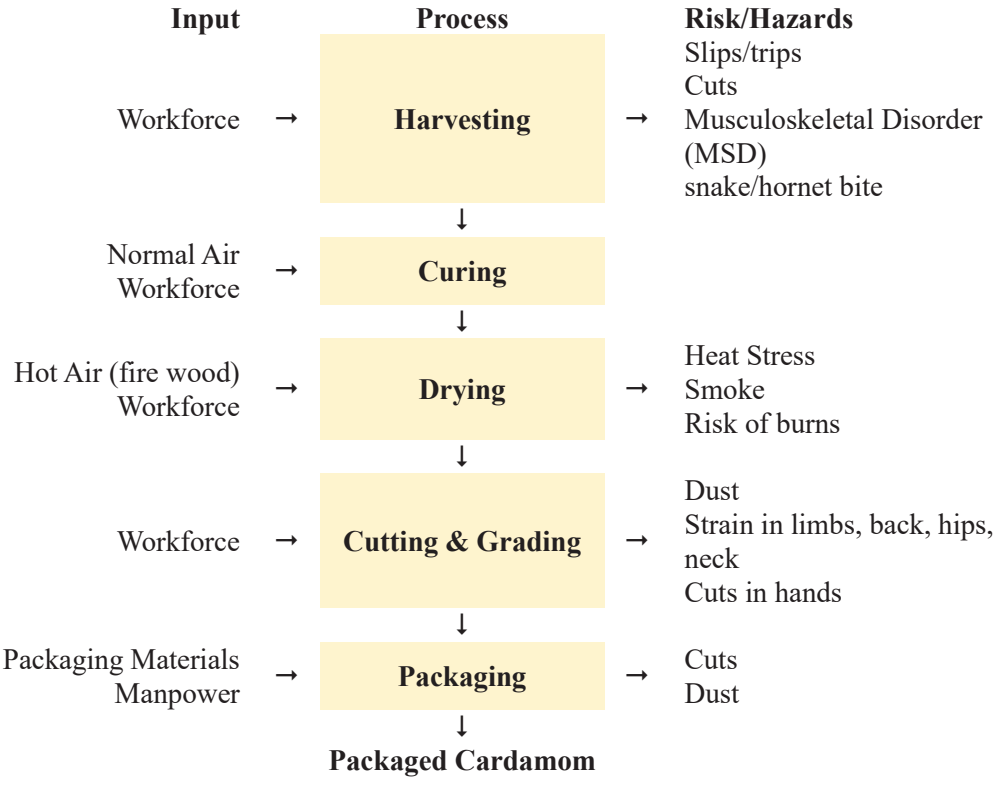
Cardamom is produced through traditional production system in the hills and mountains of eastern Nepal. In recent years; cardamom production has widespread in 53 districts of the country.

Nepali large cardamom (Amomum Subulatum Roxburgh.) also known as 'black gold' or 'black cardamom' and locally called alainchi – belongs to the botanical family called Zengiberaceae. Cardamom involves two-stage processing; primary processing and secondary processing unit. Primary processing includes, harvesting, curing, drying and the secondary processing includes cutting, grading, sorting and packing.[11]

Production Process Flowchart

The production flow chart of cardamom is presented below:

Figure 3.2.1: Process Flow Chart of Cardamom



[11] Jiban Shrestha et al., "Large cardamom in Nepal: Production practice and economics, processing and marketing," (2018), 5.

Description of Production Process

Harvesting

The cardamom harvesting period is from mid-August to the end of October, depending on the height and inclination of the field. After the harvest, cardamom needs to be separated from the roots. Knife and sickles are commonly used for harvesting. The separated capsules are cleaned manually before curing to remove other plant materials.[12] It has been observed that there are no modern sophisticated or automated machineries developed or implemented yet.

Curing

Curing is one of the important steps to determine the quality of cardamom. Fresh cardamom capsules contain about 70 to 80% moisture (on wet basis) depending upon the maturity levels of capsules at the time of harvest.[13]To achieve optimum moisture level and other quality-defining factor, the spikes with ripened capsules are harvested and heaped (cured) for 2-3 days. After heaping, capsules are stripped off from the spikes, cleaned and subjected to drying.

Drying

Cardamom is dried below 10 percent (wet basis) moisture content for the safe storage level and marketing of cardamom.[13] Drying of large cardamom is carried out in dryer (traditional a known as Bhatti). Traditional wood-fired dryers as well as improved dryers are used. The traditional dryer causes blackening of the capsules and gives smoky flavor. Yet the use of improved dryer is limited due to their costs. Similarly, availability of dryers at local level and there has been a lack of farmers' knowledge to operate the improved dryers.

a) *Traditional dryer:* In the traditional dryer, capsules are spread on the mesh over the firing zone where the capsule are dried by the direct effect of heat and smoke. Wood is used as fuel in the dryer. The process takes 24-36 hours and frequent stirring is done to obtain uniform drying. The dryer capsules haves blackish colour with smoky flavor. There is a production of large quantity of burned, cracked capsules having less volatile oil in traditionally dried capsules.[11]

b) *Improved Dryer:* In this, heating is subjected indirectly through hot air and smoke is released outwards. Heat in the absence of smoke in improved dryers gives more natural color and better-quality product than traditional method.

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[12] Angom I. Singh and Anand K. Pothula, "Postharvest processing of large cardamom in the Eastern Himalaya." *Mountain Research and Development* 33, no. 4 (2013), 453-462.
[13] Sanjay Mande et al., "A study of large-cardamom curing chambers in Sikkim." *Biomass and Bioenergy* 16, no. 6 (1999), 463-473.

In addition to these, solar dryer and electric dryer are also in limited use. The dried capsules are then transported to secondary processing units for further processing.[11]

Cutting and Grading

The cardamom has a tail, which is removed with scissor and then sorted according to its size/quality. Polyethylene sacks are normally using to pack cardamom capsules that are sealed and store in dry place.[11]

4. Major Hazards and Risks

Workers in the tea and cardamom sector are exposed to a variety of occupational hazards and risk.

4.1. Tea

Difference types of hazards exist in garden and factory. Garden workers are also exposed to physical hazards such as sunlight, humidity, heat/cold during plucking of tea leaves that may cause heat stress and dehydration among workers. There is also potential of mechanical hazard as they work in wet/slippery land and use tools for pruning the tea branches that might lead to scratches, cuts, slip/trip/fall as well as other injuries. Vehicles used for collecting tea leaves in gardens is likely to cause accidents. Similarly, use of pesticide in the gardens can cause skin allergy, other disease related disease to skin and may lead to chronic health impact. Working in standing posture and bending to pluck tea leaves can lead to physiological ailments such as strain in spinal cord, neck, back, shoulder and musculoskeletal disorder among workers. Threat from snakes, insects and mosquitoes is also high in gardens.

Table 4.1.1: Major Hazards and Risk in Tea Garden: Source and Impact

[3]

Hazards	Sources	Potential risk to injuries	Potential risk to health	Potential of other impact
Physical	- Sun Light, - High Humidity - High Heat	Skin Burns	▪ Dehydration ▪ Heat Stress	
	- Cold	Frostbite	▪ Hypothermia ▪ Pneumonia	
	- Lightening	Death	-	Fire
Chemical	- Pesticides	Skin burns	▪ Skin allergy ▪ Skin diseases ▪ Chronic occupational diseases ▪ Cancer	Environmental pollution
	- Dust	Foreign body in eyes	▪ Respiratory related diseases	
Mechanical	- Improper malfunctioned hand tools - Wet and slippery land /slope - Tea branches - Vehicle movement	Scratches, cuts, slip, trip, falls, bone fracture, head injuries	-	Property damages
Physiological	- Standing work - Working practices	Injuries in spinal cord, neck / back / shoulder pain	▪ Musculoskeletal Disorder (MSD)	

Hazards	Sources	Potential risk to injuries	Potential risk to health	Potential of other impact
Biological	- Snake - Insect - Caterpillar - Mosquito	Skin allergy / pain	▪ Minor to death	
Psychosocial	- Alcohol - Drugs - Stress	-	▪ Minor to major mental health disorder	Negative message to the society

Factory workers are exposed to physical hazards, such as noise, heat and electricity. Workers in the heater and drying section have high potential to heat stress and burns. Poor electrical safety in the factories, which reflects increased probability of electrocution. Due to lacking of emergency preparedness system risk of fire and potential of asset loss is very high. Similarly, use of machinery/equipment, wet/slippery floor as well as poor walkways defined inside factory can lead to slip, tip, fall, cuts, bone fracture and other injuries. Tea dust from the tea processing process may cause acute and chronic pulmonary health problems, skin allergies among workers. In additional to these, working without maintain correct posture, standing for long hours is likely to led to injuries in spinal cord, neck, back and shoulder pain.

Besides these, psychosocial hazard such as alcoholism, drug use, poor implementation of labour laws, weak OSH management system are some factors that are likely to push tea enterprises towards becoming "sick industry".

Table 4.1.2: Major Hazards and Risk in Tea Factory: Source and Impact

Hazards	Sources	Potential risk to injuries	Potential risk to health	Potential of other impact
Physical	- Noise		▪ Noise induced hearing loss	
	- Heat	Burns	▪ Heat Stress ▪ Dehydration,	Fire
	- Electricity	Electrocution	-	
Chemical	- Tea dust	Foreign body in eyes	▪ Skin allergy ▪ Acute and chronic respiratory problem	Environmental pollution
Mechanical	- Machines - Hand tools - Wet and slippery floor	Cuts, slip, trip, falls, bone fracture, injuries in different body parts	-	Property damages
Physiological	- Standing - Working practices	strain in spinal cord, neck /	▪ Musculoskeletal Disorder (MSD)	

Hazards	Sources	Potential risk to injuries	Potential risk to health	Potential of other impact
	- Poor ergonomics - Poor posture	back / shoulder/limbs		
Psychosocial	- Alcohol - Drugs - Stress	-	▪ Minor to major mental health disorder	Negative message to the society
Biological	- Poor sanitation - Poor hygiene	Skin allergy / pain	▪ Allergy ▪ Diarrhea ▪ Dysentery ▪ Cold, cough	

4.2. Cardamom

In primary processing of cardamom, farmers as well as workers are exposed to physical hazards such as sunlight, humidity, heat/cold during plantation, weeding and harvesting. For harvesting sickle and knife is used which creates mechanical hazard that may lead to cut and scratches. Likewise, working on wet and sloppy land may cause slip, trip and fall. Use of pesticide in the cardamom farming can cause skin allergy, other disease related disease to skin and chronic health impact.

During drying of cardamom capsule, farmers shift the hot cardamom and are exposed to heat, smoke and vapors that may create respiratory illness. Further, sitting practice, loading/unloading work causes physiological hazard with potential of strain in spinal cord, neck, back, shoulder, limbs and musculoskeletal disorder. Biological hazard, for instance snake and hornet bite are also likely to cause illness among workers.

In secondary processing units, working in poor illuminated and poor ventilated rooms may cause eye problem, breathing problem and asthma. Using scissor for cutting tail of cardamom capsule can cause cut and scratches. Similarly, during grading and sorting, cardamom dust is generated that may lead to chronic respiratory illness. Further, the sitting practice of workers, loading/unloading of the cardamom filled sacks can cause physiological hazard with potential of strain in spinal cord, neck, back, shoulder, limbs and musculoskeletal disorder. Poor sanitation and hygiene, lack of welfare facilities, no separate toilets for women workers leads absenteeism of workers and acute health effects.

Besides these, psychosocial hazard such as alcoholism may cause minor to major health disorder. Similarly, poor implementation of labour laws, temporary workforce, seasonal work, traditional work methods, weak management system are some factors that are likely to push cardamom enterprises towards becoming “sick industry”.

Table 4.2.1 Major Hazards and Risk in Cardamom Sector: Source and Impact

Hazards	Sources	Potential risk to injuries	Potential risk to health	Potential of other impact
Primary Processing				
Physical	- Sun Light, - High Humidity - High Heat	Skin Burns	▪ Dehydration ▪ Heat Stress	
	- Cold	Frostbite	▪ Hypothermia ▪ Pneumonia	
	- Lightening	Death	-	Fire
Chemical	- Pesticides	Skin burns	▪ Skin allergy ▪ Skin diseases ▪ Chronic occupational diseases ▪ Cancer	Environmental pollution
	- Smoke	Eyes Irritation	▪ Respiratory Illness	
Mechanical	- Improper/ malfunctioned hand tools - Wet and slippery land/slope - Machines	Scratches, cuts, slip, trip, falls	-	Property damages
Physiological	- Sitting practices - Loading/unloading practice	strain in spinal cord, neck, back, shoulder/ limbs	▪ Musculoskeletal Disorder (MSD)	
Biological	- Snake - Hornet - Caterpillar	Skin allergy / pain	▪ Minor to death	
Psychosocial	- Alcoholism	Injuries may not be seen	▪ Minor to major health disorder	Negative message to the society
Secondary Processing				
Physical	- Poor illumination	Eyes strain	▪ Eyes tearing ▪ Poor eyes sight	
	- Poor ventilation	-	▪ Occupational asthma	
Chemical	- Cardamom dust	Breathing ailment	Acute and chronic respiratory illness	
Mechanical	- Improper/ malfunctioned hand tools	Scratches, cuts	-	
Physiological	- Sitting practices - Loading/unloading practice	strain in spinal cord, neck, back,	▪ Musculoskeletal Disorder (MSD)	

Hazards	Sources	Potential risk to injuries	Potential risk to health	Potential of other impact
	- Poor Ergonomics	shoulder/ limbs		
Psychosocial	- Alcoholism - Drugs - Stress	Injuries may not be seen	▪ Minor to major health disorder	

5. Mitigation and Prevention Measures of Risk Related to Occupational Safety and Health

This chapter presents OSH measures based on hierarchy of hazard control measures, which is fundamental for managing workplace risks effectively.

The following table outlines comprehensive OSH measures applicable to both the tea sector and secondary processing units (factory) of cardamom.

Aspects	OSH Measures
Policy and Governance	- Formulate OSH Policy, register in the Labour and Employment office - and display inside the premises within the Nepali language so that everyone can understand - Formulate OSH Committee and register in the Labour and Employment office and implemented - Hold regular meetings to review safety performance, address concerns, and implement improvement - Provide employment contracts to workers - Ensure all workers are provided at least the minimum wage as gazette by the government. - Provide benefits such as provident fund (PF), gratuity, bonus, and others as entailed in the Labour Act, 2017. - Affiliate workers to the Social Security Fund as specified by GON - Ensure workers are provided with weekly leave, public holidays, sick leave, and mourning leave as mentioned in the labour laws. - Provide accident insurance covering medical treatment for work related accidents to all workers - Conduct OSH training sessions at regular intervals including chemical safety, electrical safety, sanitation and hygiene, workplace safety measures and personal protecting equipment - Include OSH issues in collective bargaining agenda
Workplace safety and health	- Conduct hazard identification and risk assessments (HIRA) at regular intervals to apply preventive and control measures. - Develop and implement measures based on assessment findings
	- Restrict manual weight lifting to safe limits (55 kg for adult males and 45 kg for adult females. - Provide mechanical lifting devices to minimize manual lifting tasks
	- Guarding of moving parts
	- Install local exhaust ventilation and exhaust ventilation systems to reduce the exposure to tea dust - Monitor air quality and conduct regular maintenance of ventilation systems - Provide dust filter mask to all workers who works in dusty area
	- Install dust collection systems with bag house - Conduct regular maintenance
	- Install non-slip flooring in critical areas to reduce the risk of slipping. - Regularly inspect and repair damage promptly
	- Provide ergonomic training

Aspects	OSH Measures
	- Provide ergonomical chair, table and tools
	- Ensure that walkways are clear, well-marked - Ensure storage area marked and materials stored in these areas only - Implement regular housekeeping and inspection
	- Keep safety signage and instructions in local language - Regularly update and maintain safety signage
	- Regular oiling and greasing in machines to reduce noise - Provide ear plug if noise exceeds 85 dBA
	- Provide safety shoes, gloves and apron to workers as required - Ensure safety gears are available in a variety of sizes that fits to both male and female workers properly.
Electrical Safety	- Ensure that all electrical equipment is insulated and properly grounded (earthing) - Conduct resistance test in all earthing point during dry season and maintain less than 2 ohms - Use double insulated cables and always use proper plugs to draw power from power socket. - Place rubber mats in front of electrical panels - Use proper size of breaker such as MCB and MCCB - Use specialized breaker (Ground Fault Circuit Interrupter (GFCI) or Earth Leakage Circuit Breaker (ELCB)) - Electrician must use safety shoes and electrical resistance gloves
Machine Safety	- Do not wear loose or frayed clothing or jewelry that could get caught between moving parts - Ensure that safety guards are in place before operating any machinery. - Follow the operating instructions from the manufacturer or supplier. - Do not try to reach into any moving parts of the machinery with your fingers - Make sure equipment's are switched off prior to cleaning. - Conduct regular maintenance - Maintain log book of maintenance
Slips, Trips and Falls	- Avoid creating obstacles in work areas and floors. - Keep floors and stairs dry and clean. - Wear footwear appropriate to the type of floor surface like non-slip working shoes or make use of anti-slip flooring. - Provide and maintain proper lighting. - Hang power cords over aisles or work areas to prevent tripping accidents. - Ensure elevated platforms are guarded against the fall of persons.

Aspects	OSH Measures
Welfare Facilities	- Provide safe and potable drinking water that is easily accessible - Regularly test and maintain water quality and supply systems - Designate toilet pits with barricades at certain locations in the garden, especially for female workers. - Regularly inspect these areas to ensure they remain clean and safe for use - Provide separate toilets for male and female workers. - Provide annual medical check-ups for tracking the health issues of workers.
Heat Related illness	**Working in Garden or outdoors** - Drink water every 15 minutes, even if you are not thirsty. - Rest in the shade to cool down. - Wear a hat and light-colored clothing. - Learn the signs of heat illness and what to do in an emergency. - Keep an eye on fellow workers. - Wearing loose-fitting, breathable clothing such as cotton and avoid non-breathing synthetic clothing. - Scheduling heavy work during the coolest parts of day. - Taking more breaks in extreme heat and humidity. - Avoiding alcohol, and drinks with large amounts of caffeine or sugar. - Being aware that protective clothing or personal protective equipment may increase the risk of heat stress. **Working in Factory** - Increase air velocity in workplace - Use reflective or heat-absorbing shielding or barriers. - Reduce steam leaks, hot air leaks, heat losses from heater and dryer and humidity. - Use tools intended to minimize manual strain. - Increase the number of workers per task. - Train supervisors and workers about heat stress. - Use a buddy system where workers observe each other for signs of heat-related illnesses. - Provide adequate amounts of cool, potable water near the work area and encourage workers to drink often. - Avoiding alcohol, and drinks with large amounts of caffeine or sugar. - Immediately inform to the supervisor in case of any symptoms or signs of heat related illness - Acclimatized the new workers during work in summer.
Accident response and Reporting	- Establish protocols for reporting accidents and incidents. - Motivate employees and encourage prompt reporting
	- Ensure that the Labour and Employment Office is informed within seven days of any major or fatal accidents.
	- Conduct accident investigation for major and fatal accident
Emergency Preparedness	- Prepare communicable disease risk management plan to prevent disease outbreak - Implement and update the plan as required

Aspects	OSH Measures
	- Keep emergency siren or hooter in factory of tea and secondary processing unit of cardamom - Regularly test and maintain alarms to ensure they are functional
	- Display emergency exit - Ensure exits are accessible and clearly marked
	- Display assembly point - Ensure assembly points are well-marked and are used for assembling
	- Prepare emergency preparedness plan - Regularly review and update the plan and ensure its effectiveness through mock drill
	- Keep first aid kits and inspect and restock first aid supplies - Train at least 2 workers as first aider
	- Keep water provisions for ordinary fire, carbon dioxide fire extinguishers for electrical fires, Foam fire extinguisher for diesel and petrol and ABC type extinguishers for other fires. See Annex 3 - Conduct training on the proper use of fire extinguishers and regularly check the fire extinguisher
Occupational disease	- Maintain records of health issues and occupational diseases reported by workers.
Harassment in Workplace	- Develop a policy against sexual harassment and its implementation - Provide sexual harassment training to employees at all levels - Develop proper reporting procedure for harassment related issues - Investigate and take action on registered and informed cases
Caterpillar management	- Removal of infested plant and its parts and burning them - In case of minor infestation collect the caterpillars manually with suitable PPEs - In case of severe infestations, spray insecticides (such as Quinalphos, Fenthion, Dimethoate, Phasalone, Chlorpyriphos etc) - Use light traps to attract and kill adult insects - Reduce and control the alternative hosts like *like Dalbergia assamica, Albizzia chinensis, A. odoratissima, Derris robusta, Acacia modesta etc.* - Remove cloth and apply ice packs, creams, lotions and other medicines to relieve the symptoms of reaction

Pesticide Use

Pesticide use in tea sector poses significant risk, hence specific OSH to this is provided in the table below.

OSH Measures
- Store pesticide in a dry place in stands away from other materials - Ensure storage facilities are well-ventilated and there is no leakage/spillage of pesticide
- Do not use pesticides that are banned in Nepal - Use only the recommended pesticide in gardens of tea and cardamom
- Train workers on handling and application of pesticide - Train workers and implement integrated pest management (IPM)

OSH Measures
- Check chemical labels and refer GHS label. Take precaution accordingly – see Annex 1
- Ensure that all components are clean and not damaged, especially filling and suction strainer, sprayer tank, and nozzle
- Use of proper PPE's (apron, face shields, goggles, mask, safety boot and gloves) - Provide training on proper donning and doffing procedures of PPE
- Avoid contamination of the skin especially eyes and mouth
- Never eat, drink or smoke when mixing or applying pesticides - Enforce strict no-eating, drinking, or smoking policies in areas where pesticides are handled or applied
- Make sure pesticides are mixed in the correct quantities - Provide clear guidelines and measuring tools for accurate pesticide mixing.
- Do not spray in high wind, high temperature and rain - Do not spray from opposite side of the wind
- Shower after spraying pesticide and clean all worn clothes, footwear - Ensure that soap, towel and plenty of water is available - Install Eye wash and shower station and use incase of emergency e.g. chemicals in eyes or in body. See Annex 2
- Do not use empty pesticide containers for any purpose - Crush and bury the containers in a land filled dump or incinerate at 1200^{o}C temperature

In addition to the above comprehensive measures, the following section provides targeted measures specific to each activity and process within the tea and cardamom sectors. These will further address the hazards and risks encountered at different stages of production, ensuring more definite effective safety practices for each operational aspect.

Tea

The table below details the specific OSH measures associated with each activity and process in the tea sector.

Area	Activity/ Process	OSH Measures
Garden	Green Leaf Collection	- Ensure clear, unobstructed pathways
		- Provide sufficient drinking water and shaded areas - Ensure breaks are provided to workers
		- Use of mechanical aids where possible reducing the need for manual lifting. - Provide training on proper lifting techniques
		- Educate workers on identifying and safely avoiding snakes and insects - Establish system for handling emergencies related to bites or injuries, including access to immediate first aid or medical care
		- Provide proper safety boots and apron in different size to fit male and female - Ensure their use

Area	Activity/ Process	OSH Measures
Factory	Withering	- In case boiler is used, conduct boiler safety inspection - Ensure boiler safety certificates are UpToDate
		- Proper grounding and insulation of electrical equipment - Regular testing and maintenance of electrical system
		- Guarding of moving parts and blades - Provide Safety training on equipment use
		- Ensure non-slippery flooring - Safety signage and clear instructions using multiple languages as needed
		- Training on safe handling practices of withered and fresh tea leaves
		- Use safety gloves and aprons/working dress
		- Provide ear plugs if sound exceeds 85 dBA
	CTC Machines or Rolling	- Ensure machine guarding and barricading
		- Ensure proper Earthing of all machines
	Fermentation	- Use of waterproof and insulated electrical tools
	Drying with heater (hot air generator)	- Use dry fire wood in heater furnace - Store fire wood in shade and prevent from rain
		- Don't feed excess fire wood in furnace at a time
		- Provide better insulation in heater and hot air supply system
		- Ensure chimney draft working properly and prevent formation of Carbon monoxide
		- Conduct energy audit and environmental audit every year
		- Provide roof top ventilation system or install exhaust fan to exhaust the hot air from workplace
		- Provide dust collection system with bag filter in dryer
		- Use of cotton clothing to workers of this section
		- Regular cleaning of tea dust by industrial Vacuum Cleaner
		- Use of dust filter mask
	Sorting & Grading and Packaging	- Install Local Exhaust Ventilation with bag filter - Regular cleaning of work areas to reduce dust buildup
		- Use of better postured sitting arrangement
		- Use of dust filter mask
		- Use of hair cap, no use of jewelry, no long nail - Proper sanitation and hygiene

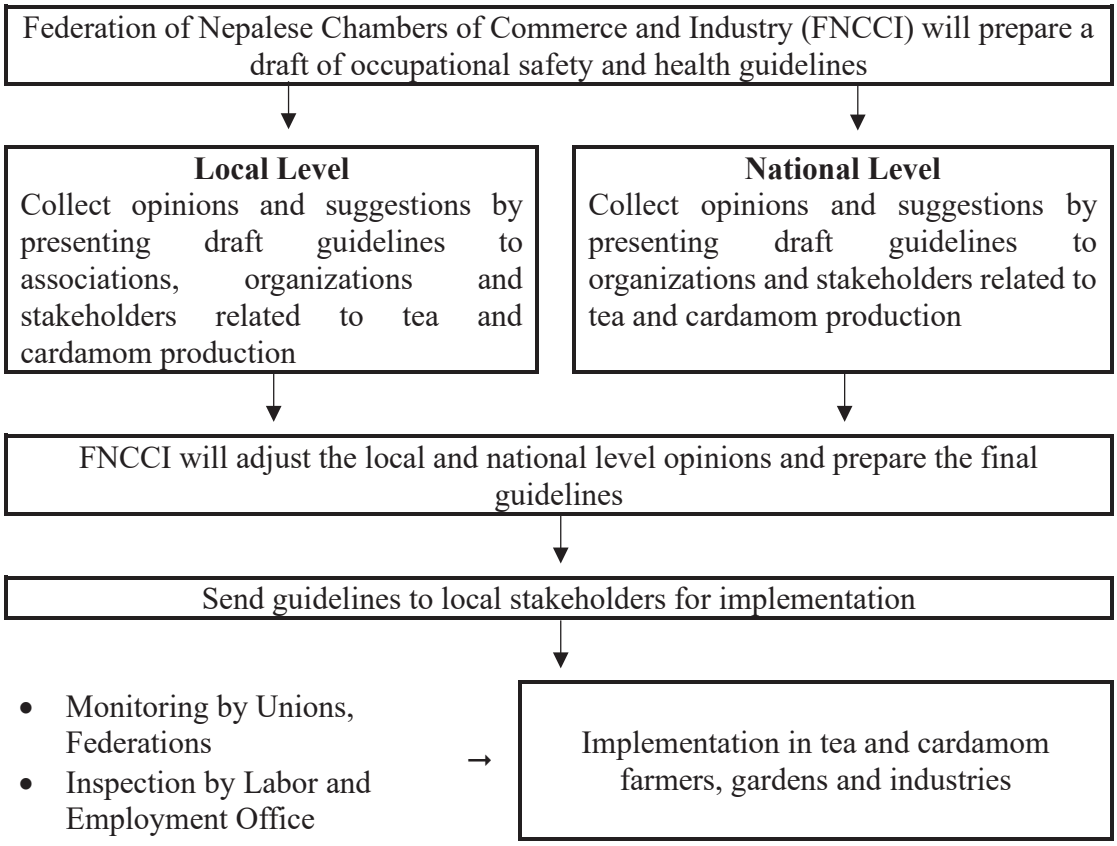
Cardamom

The table below details the specific OSH measures associated with each activity and process in the cardamom sector.

Area	Activity/ Process	OSH Measures
Primary Processing	Harvesting	- Ensure clear, unobstructed pathways - Regular inspection and maintenance of walkways

Area	Activity/ Process	OSH Measures
		- Provide sufficient drinking water and shaded areas - Ensure breaks are provided to workers
		- Use of mechanical aids where possible reducing the need for manual lifting - Provide training on proper lifting techniques
		- Educate workers on identifying and safely avoiding snakes and insects - Establish system for handling emergencies related to bites or injuries, including access to immediate first aid or medical care
		- Provide proper safety boots and apron in different size to fit male and female
	Drying	- Use improved dryer/solar dryer instead of traditional dryer
		- Use dry fire wood - Store fire wood under shed
		- Provide adequate ventilation
		- Train workers on safe handling practices
		- Provide cotton clothing - Use of hand gloves and safety boot
Primary and Secondary Processing	Loading/Unloading	- Restrict manual weight lifting to safe limits (55 kg for adult males and 45 kg for adult females - Provide mechanical aids to support loading/unloading of cardamom - Train workers on safe loading/unloading practices - Train workers on good ergonomics practices - Use mask, working dress, gloves while loading/unloading
Secondary Processing	Cutting & Grading and Packaging	- Install wall mounted adequate exhaust fan - Regular cleaning of work areas by industrial vacuum cleaner
		- Provision of Light level more than 300 lux
		- Train workers on safe handling to prevent cuts - Keep first aid kit readily available
		- Working place arrangement for sitting and standing
		- Ergonomic training and proper lifting techniques
		- Provide dust filter masks, hair caps, gloves
		- Provision of eye wash shower See Annex 2
		- Proper cleanliness of toilet
		- Provisions of liquid soap for hand wash
	Storing Cardamom	- Store cardamom by multi-stacking it - Maintain proper ventilating in the storage area - Avoid exposure to moisture - Maintain Last In First out (LIFO) and First In First Out (FIFO)

6. Implementation Plan



7. Implementation Plan

Effective implementation and compliance with occupational safety and health guidelines for tea and cardamom plantations and processing operations requires each relevant agency and stakeholder to fulfill important responsibilities, thereby promoting workplace safety and a coordinated approach. The concerned bodies and their major responsibilities are described in detail below.

1. Federation of Nepalese Chambers of Commerce and Industry (FNCCI)
2. Sectorial Association
   - 2.1 Tea Producers
   - 2.2 Cardamom Producers
3. Enterprises

1. Federation of Nepalese Chambers of Commerce and Industry (FNCCI)

The Federation of Nepalese Chambers of Commerce and Industry (FNCCI), at the center, arranges necessary policy arrangements to ensure the effective implementation and compliance of Occupational Safety and Health Guidelines for Tea and Cardamom Plantations and Processing Operations, and enforces the said arrangements at the local level by sectorial associations and enterprises and monitors them.

a) Develop policies related to occupational safety and health,
b) Conduct policy dialogues with members on occupational safety and health,
c) Organize occupational safety and health awareness programs,
d) Supervise and inspect enterprises to ensure effective implementation and compliance with occupational safety and health guidelines,
e) Plan and provide training on occupational safety and health, and
f) Formulate a code of conduct for occupational safety and health.

2. Sectorial Association

The related sectorial associations handle local responsibilities based on the Occupational Safety and Health Guidelines for Tea and Cardamom Plantations and Processing Operations.

2.1 Tea Producers

a) Develop policies related to occupational safety and health in local level for tea production sector,
b) Conduct policy dialogues with members on occupational safety and health in local level for tea production sector,
c) Organize occupational safety and health awareness programs in local level for tea production sector,

d) Supervise and inspect enterprises to ensure effective implementation and compliance with occupational safety and health guidelines in local level for tea production sector,
e) Plan and provide training on occupational safety and health in local level for tea production sector, and
f) Formulate a code of conduct for occupational safety and health in local level for tea production sector.

2.2 Cardamom Producers

a) Develop policies related to occupational safety and health in local level for cardamom production sector,
b) Conduct policy dialogues with members on occupational safety and health in local level for cardamom production sector,
c) Organize occupational safety and health awareness programs in local level for cardamom production sector,
d) Supervise and inspect enterprises to ensure effective implementation and compliance with occupational safety and health guidelines in local level for cardamom production sector,
e) Plan and provide training on occupational safety and health in local level for cardamom production sector, and
f) Formulate a code of conduct for occupational safety and health in local level for cardamom production sector.

3. Enterprises and Factories

a) Enterprises and factories must allocate the necessary resources and tools to implement the provisions of this Occupational Safety and Health Guidelines.
b) Establish an Occupational Safety and Health Committee to ensure participation from all factory workers and facilitate the correct implementation of the Occupational Safety and Health Guidelines.
c) Display the guidelines in the local language within the industrial premises so that it is visible to all workers, or make it readily available.
d) Raise awareness and educate all workers, supervisors, and managers about occupational safety and health guidelines, and provide training as needed.
e) Conduct various occupational safety and health related programs at the workplace as required.
f) Perform regular inspections and monitoring to ensure that the guidelines are being implemented effectively.

Workers Duties

It is the responsibilities of the workers to obey the national laws and guidelines for their own safety and good health.

a) Comply with all OSH measures mentioned in the OSH guidelines.

b) Raise their voice and concerns in the respective workplace and OSH committee.

c) Engage actively in training programs and provide feedback on OSH practices within the workplace.

d) Stay informed about their rights and responsibilities related to occupational safety and health.

e) Take reasonable steps to protect their own safety and health and that of others by practicing safe work methods and procedures.

f) Follow all OSH-related instructions provided by the employer and adhere to safety protocols.

g) Cooperate with the employer and other workers to promote a safe and healthy workplace culture.

h) Report any situation that they have reason to believe could present a hazard to their health or safety, including near misses.

i) Inform management about hazards, incidents, injury to health or danger occurrences immediately, ensuring proper documentation and follow-up.

j) Keep their work area clean and organized to minimize risks and maintain a safe working environment.

k) Understand and participate in emergency response procedures, including evacuation routes and first-aid measures.

l) Use safety devices and protective equipment correctly and ensure they are maintained in good condition.

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Annex: 1: Globally Harmonized System (GHS) Labels pictogram for Chemicals

Oxidizers

Flammables, Self Reactives, Pyrophorics, Self-Heating, Emits Flammable Gas, Organic Peroxides

Explosives, Self Reactives, Organic Peroxides

Acutely Toxic

(severe)

Burns Skin, Damages Eyes, Corrosive to Metals

Gases Under Pressure

Carcinogen, Respiratory Sensitizer, Reproductive Toxicity, Target Organ Toxicity, Mutagenicity Aspiration Toxicity

Toxic to aquatic environment

Acutely toxic(harmful), Irritant to skin, eyes or respiratory tract, Skin sensitizer, Hazardous to the Ozone layer.

Annex 2: Eye wash and shower Station

Annex 3: Types of Fire Extinguisher and their Use

		POWDER	FOAM	CO_2	WATER	WET CHEMICAL
	Wood, Paper Cloth Etc	✓	✓	✗	✓	✗
	Grease, Oil, Paint, Solvents	✓	✓	✓	✗	✗
	Magnesium, Aluminum, Etc	✓	✗	✗	✗	✗
	Electrical Panel, Motor, Wiring Etc	✓	✗	✓	✗	✗
	Cooking Oils, Animal Fats, Etc	✗	✗	✗	✗	✓

Annex 4: Industrial Vaccum Cleaner

Annex 5: List of Pesticides Banned in Nepal

नेपालमा प्रतिबन्धित बिषादिहरूको सूची

क्रसं	प्रतिबन्धितबिषादिहरु	प्रतिबन्धितमिति
१	Chloradane (क्लोरडेन)	२०५७/१२/२७
२	DDT (डि.डि.टि)	२०५७/१२/२७
३	Dieldrin (डाईअल्ड्रिन)	२०५७/१२/२७
४	Endrin (इन्ड्रिन)	२०५७/१२/२७
५	Aldrin (अल्ड्रीन)	२०५७/१२/२७
६	Heptachlor (हेप्टाक्लोर)	२०५७/१२/२७
७	Mirex (मिरेक्स)	२०५७/१२/२७
८	Toxaphen (टक्जाफेन)	२०५७/१२/२७
९	B.H.C. (बि एच सी)	२०५७/१२/२७
१०	Lindane (लिनडेन)	२०५७/१२/२७
११	Phosphamidon (फोस्पामिडन)	२०५७/१२/२७
१२	Organomercuric compound (अर्गानोमर्क्यद्रिक कम्पाउन्ड)	२०५७/१२/२७
१३	Methyl parathion (मीथायलपाराथियन)	२०६४/०९/१६
१४	Monocrotophus (मोनोक्रोटोफस)	२०६४/०९/१६
१५	Endosulphan (इण्डोसल्फान)	२०६९/०७/२०
१६	Phorate (फोरेट)	२०७२/०३/२०
१७	Carbofuran (कार्बोभ्यद्रान)	२०७५/०१/१६
१८	Carbaryl (कार्बारायल)	२०७५/०१/१६
१९	Dichlorovus (डाइक्लोरोभस)	२०७५/०१/१६
२०	Trizophus (ट्राइजोफस)	२०७५/०१/१६
२१	Benomyl (बेनोमाइल)	२०७६/०४/१५
२२	Carbosulphan (कार्बोसल्फान)	२०७६/०४/१५
२३	Dicofol (डाइकोफोल)	२०७६/०४/१५
२४	Aluminium Phosphide 3g tablet (अल्मिनियमफोस्फाइड ३ ग्राम ट्याब्लेट)	२०७६/०४/१५

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