Potential Health Hazards in Landscaping Work and Their Prevention and Control

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OSH Specialist Department
Occupational Safety and Health Division

25 Apr 2014
Agenda

Overview of Workplace Health Hazards

Prevention and Control

Information and Resources
## Risk Management

1. Identify Hazard
2. Evaluate Risk
3. Control the Risk

### Risk Management Table

<table>
<thead>
<tr>
<th>Severity</th>
<th>Likelihood</th>
<th>Rare (1)</th>
<th>Remote (2)</th>
<th>Occasional (3)</th>
<th>Frequent (4)</th>
<th>Almost Certain (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic (A)</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Major (B)</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Moderate (C)</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Minor (D)</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Negligible (E)</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Risk Management for Health-Related Hazards

Step 1: Hazard Identification

Step 2: Likelihood
Exposure Assessment

Exposure level & time
eg. Industrial Hygiene
Monitoring

Step 3: Consequences
Hazard Characterization

Effects of exposure
eg. NID, chemical poisoning

Step 4: Risk Characterization

Exposure / Permissible limit

Step 5: Risk Control

Step 6: Documentation & Communication
Workplace Health Hazards

- Noise
- Chemical
- Heat Stress
- Ergonomics factors
- Other health hazards
  - Biological
Adverse Effects of Noise

- Acoustic trauma (due to high impact noise)
- Noise Induced Deafness
  - Nerve cells damaged
  - Early stage (affects > 3,000 Hz)
  - Late stage
  - No cure
  - Early detection by hearing test
Risk Factors for Hearing loss or NID

- Sound pressure level
- Exposure duration
- Frequency
- Susceptibility
Other Effects of Noise

- Tinnitus (ringing in the ears)
- Annoyance / irritation
- Interference with speech communication and with perception of warning signs
- Disruption of job performance
## Risk of Hearing Loss

<table>
<thead>
<tr>
<th>Sound Pressure Levels (dBA)</th>
<th>Population at Risk of Developing NID</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>1%</td>
</tr>
<tr>
<td>85</td>
<td>8%</td>
</tr>
<tr>
<td>90</td>
<td>25%</td>
</tr>
</tbody>
</table>
## Permissible Exposure Levels

<table>
<thead>
<tr>
<th>Sound Pressure Level (dBA)</th>
<th>Maximum Duration (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>16</td>
</tr>
<tr>
<td>83</td>
<td>12 ¾</td>
</tr>
<tr>
<td>85</td>
<td>8</td>
</tr>
<tr>
<td>88</td>
<td>4</td>
</tr>
<tr>
<td>91</td>
<td>2</td>
</tr>
<tr>
<td>94</td>
<td>1</td>
</tr>
<tr>
<td>97</td>
<td>½</td>
</tr>
<tr>
<td>100</td>
<td>¼</td>
</tr>
<tr>
<td>103</td>
<td>7 ½ mins</td>
</tr>
<tr>
<td>106</td>
<td>4 mins</td>
</tr>
<tr>
<td>109</td>
<td>2 mins</td>
</tr>
<tr>
<td>112</td>
<td>&lt;1 min</td>
</tr>
<tr>
<td>120-140</td>
<td>&lt;10 sec</td>
</tr>
</tbody>
</table>

No exposure to above 140 dB is allowed.
Audiometry Stats
Number of workers under medical surveillance by year
Noise Hazards – Landscape Sector

Grass cutting machine

Hollow Tining Machine

Chain-saw

Auger Drill

Pressure Jet Washer

Credit: Images were obtained from internet sources.
Noise Hazards

Leaf blower starting up
Up to 90dBA

Blower at highest airflow (when workload is heavy)
Up to 100dBA
Hierarchy of Control

1. **Elimination**
   - Can noisy processes be eliminated?

2. **Substitution**
   - Equipment with lower noise emission

3. **Engineering Control**
   - Silencers

4. **Administrative Control**
   - Training/Reduced exposure time

5. **Personal Protective Equipment**
   - Hearing protectors
Hearing Protectors

Levels $\leq 100$ dBA

Levels $\geq 100$ dBA
Ear Plugs

Advantages
- Small & easy to carry
- Can be worn with glasses, helmet or hair styles
- Relatively comfortable in hot environment
- Less costly

Disadvantages
- Need more time for fitting
- Less amount of protection
- Difficult to monitor usage
- Only for healthy ear canals
- Can introduce dirt into the ear canals
Correct Method of Wearing Earplugs

PROTECT YOUR HEARING
要保护您的听觉

WEAR IT RIGHT!
请即刻戴上它!

1. Holding the earplug by the stem.
2. Inserting the earplug into the ear canal.
3. Rolling the earplug by hand to ensure a snug fit.
4. Ensuring the earplug is securely in place.

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# Ear Muffs

## Advantages
- Better protection
- Can fit large % of heads
- Wearers can be monitored easily
- More readily accepted
- Can be worn with ear infections
- Not easily misplaced or lost

## Disadvantages
- Uncomfortable in hot environment
- Not as easily carried or stored
- Not compatible with glasses, hair styles
- More expensive
How do you know if you are losing your hearing ability?

Audiometric Examination (Hearing Test)

- Yearly test

- Monitors the effectiveness of the HCP in preventing NID, and detecting early hearing impairment
Hazardous Chemicals
5th schedule of WSHA –

Hazardous Substances

1. Corrosive substances
2. Flammable substances
3. Explosives
4. Oxidising substances
5. Pyrophoric substances
6. Gases under pressure
7. Organic peroxides
8. Self heating substances
9. Self-reactive substances
10. Substances which in contact with water, emit flammable gases
11. Toxic substances
12. Mutagens
13. Carcinogens
14. Teratogens
15. Sensitizers
16. Irritants
17. Substances hazardous to aquatic environment
GHS (9) Pictograms

Explosives
Self-reactive substance
Organic peroxide

Flammable substance
Self-reactive substance
Pyrophoric and self-heating substance
Organic peroxides

Oxidizing substance

Compressed gas

Corrosive to metal
Skin corrosion
Serious eye damage

Environmental hazard

Acute toxicity

Acute toxicity
Skin irritation
Eye irritation
Sensitization (Dermal)
Target organ toxicity
Hazardous to the ozone layer

Sensitization (Respiratory)
Mutagenicity
Carcinogenicity
Reproductive toxicity
Target organ toxicity
Aspiration hazard

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# Classification of Chemicals

## Flammable Liquid

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flash point &lt;23°C and initial boiling point ≤35°C</td>
</tr>
<tr>
<td>2</td>
<td>Flash point &lt;23°C and initial boiling point &gt;35°C</td>
</tr>
<tr>
<td>3</td>
<td>23°C ≤ Flash point ≤ 60°C</td>
</tr>
<tr>
<td>4*</td>
<td>60°C ≤ Flash point ≤ 93°C</td>
</tr>
</tbody>
</table>

* Cat 4 combustible liquid is not required except for diesel
Example: Use of Gasoline
**Example: Gasoline**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline, natural; Low boiling point naphtha</td>
<td>10 - 30%</td>
</tr>
<tr>
<td>Toluene</td>
<td>10 - 30%</td>
</tr>
<tr>
<td>Xylene</td>
<td>10 - 30%</td>
</tr>
<tr>
<td>Ethanol</td>
<td>0 - 8.2%</td>
</tr>
<tr>
<td>Trimethylbenzene</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Isopentane</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Benzene</td>
<td>Less than 1.3%</td>
</tr>
<tr>
<td>Pentane</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Butane</td>
<td>1 - 20%</td>
</tr>
<tr>
<td>Heptane</td>
<td>0.5 - 0.75%</td>
</tr>
<tr>
<td>N-hexane</td>
<td>0.5 - 0.75%</td>
</tr>
</tbody>
</table>
Example: Gasoline

Flammable Liquid – Category 1 or 2 depending on formulation
Aspiration Hazard – Category 1
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeate...
Examples of Chemicals used in Landscaping Sector

**Pesticides**

- Dimethoate (40% EC)
- White Summer Oil (80% Paraffin Oil)
- Benomyl (Benlate, 50% WP)
- Snail Pellet (3-5% Metalaldehyde)
- Alachlor 45% (Lasso)
- Glyphosate 41 % (Roundup)
- Captan (50% WP)
- Redomil (25% WP)
- Anti-termite insecticide, Chlorpyrifos
- Bacillus Thuringiensis (17,600 I.U per mg)
- Plant stimulant (Bioact –T35)

- Calixin Tridemorph
- Captan Trimegol
- Copper-oxychloride Cobox Trifoltan
- Etridiazole Terrazole
- Oxycarboxin Plantvax 75
- Ridomil 58
- Thiram Tripimol
- Ziram
- Diazinon (60% EC)
- Others
Examples of Chemicals used in Landscaping Sector

Fertilisers

- Granulated compound fertilizer (14:9:20:2 MgO + TE)
- Granulated compound fertilizer (15:15:15)
- Granulated compound fertilizer (12:12:17:2)
- Organic fertilizer (100 % organic matter)
- Rock phosphate (30% P²O⁵)
- Kieserite (27% MgO)
- Potash (60% KO)
- Urea (46% N)
- Dolomite
- Iron chelate
- Organic Liquid Humus (Humic Acid 12%)
- Organic Liquid Fertilizer
- Others
Exposure Routes

• Skin contact
  - usually slow absorption

• Inhalation (breathing in)
  - absorption can be very rapid

• Ingestion (eating, swallowing)
  - rapid absorption

• Splashes which may result in chemical contact with the skin, eyes, or mucous membranes
Effects of Chemical Exposure

Dermal
- Chemical burns
- Skin irritation
- Skin sensitization

Inhalation
- Respiratory irritation
- Lung diseases
- Respiratory sensitization

Credit: Images were obtained from internet sources
Effects of Chemical Exposure

Eye contact
- Eye irritation
- Eye inflammation

Ingestion
- Poisoning
- Burns to mucous membranes, throat and stomach

Credit: Images were obtained from internet sources
Chemical Hazards Control

1. At the source
2. Along the path
3. At the receiver
At the Source

- Elimination/Substitution
- Modification (change of process)
- Automation or containment
- Enclosure of process
- Isolation of process
- Wet method
- Local exhaust ventilation
- **Maintenance** of equipment
Along the Path

- Dilution ventilation
- Increase distance between source & receiver
- Upwind vs downwind
- Access control
- Area monitoring
- Housekeeping (cleanup spill)
At the Receiver

- Safe work practices
- Rotation of workers
- Personal monitoring
- Personal protective equipment
- Training & education
- Biological monitoring
- Personal hygiene
Chemical Hazards

- Application of pesticides and herbicides
- Application of fertilisers

Presence of Organophosphates

- Affects central nervous system
- Can cause the following:
  - Anxiety
  - Headache
  - Depression of respiration and circulation
  - Tremor
  - Potentially coma

Credit: Images were obtained from internet sources
Cleaning agents

Wet work

- Repeated or prolonged contact with water/soap/detergent
- Can cause contact dermatitis
Preventive Measures on Handling Chemicals

- Obtain Safety Data Sheet of the chemicals and assess the information
- Use less hazardous chemicals at recommended rates
- Know the hazards of the chemical
- Observe the precautionary measures
- Implement hazard communication programme such as training the persons handling the chemicals
Preventive Measures on Handling Chemicals

- Label containers
- Store chemicals in proper containers
- Segregate incompatible chemicals
- Practise good personal hygiene
  - Wash hands before eating
  - Keep food & drink away from handling areas
- Wear suitable protective equipment (eg. Impervious gloves, respirator)
Hazard Communication


Key Components
- Labelling
- Hazards of chemicals in work area
- Protective measures against chemical exposures
- Location of SDS
- Training etc.

Records of Training
- Persons attended
- Topics covered
Safety Data Sheet

1. Identification
2. Hazard(s) identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal information
14. Transport information
15. Regulatory information
16. Other information
## Use of SDS

<table>
<thead>
<tr>
<th>Substances Info &amp; Properties</th>
<th>Hazard Prevention and Protection</th>
<th>First Aid &amp; Emergency Response</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identification</td>
<td>1. Identification</td>
<td>1. Identification</td>
<td>1. Identification</td>
</tr>
</tbody>
</table>

Globally Harmonized System of Classification and Labelling of Chemicals
KEEP OUT OF REACH OF CHILDREN – CAUTION – Harmful if swallowed, inhaled or absorbed through skin. Causes eye irritation. Avoid contact with skin, eyes, or clothing. Avoid breathing vapor or spray mist. Avoid contamination of food and feed. Food utensils such as tablespoons and measuring cups should not be used for food purposes after use in measuring pesticides. Keep out of reach of domestic animals. Do not use on humans, household pets or livestock. Do not contaminate ornamental fishponds.

This product is an off-white liquid with slight sulfur-like odor.

Warning Statements:

NOTE TO PHYSICIAN: This product is an organophosphate (cholinesterase-inhibiting) insecticide. Atropine is antidotal and should be given in multiple doses as necessary until the patient is atropinized. 2-PAM is also antidotal, but should be administered only in conjunction with Atropine. Monitor serum and RBC cholinesterase. Morphine, theophylline, aminophylline, phenothiazines, reserpine, furosemide, or ethacrynic acid are contraindicated in organophosphate poisonings. Administer intravenous fluids cautiously, if needed, to correct dehydration. Symptoms of cholinesterase inhibition can include headache, dizziness, blurred vision, weakness, nausea, cramps, diarrhea, discomfort in the chest, nervousness, sweating, miosis, tearing, salivation, pulmonary edema, uncontrollable twitches, convulsions, coma, and loss of reflexes and sphincter control.
Product Labelling

Isopropyl Alcohol

**Danger**

- **Signal Word**
- **Pictograms**

**Precautionary Statements**

- P210*: Keep away from heat/sparks/open flames/hot surfaces - no smoking
- P243*: Take precautionary measures against static discharge
- P271*: Use only outdoors or in a well-ventilated area
- P243*: Take precautionary measures against static discharge
- P281*: Avoid breathing vapour/mist/spray
- P261*: Avoid breathing vapour/mist/spray
- P286*: Wear protective gloves/protective clothing/eye protection/face protection

**Hazard Statements**

- H225*: Highly flammable liquid and vapour
- H319*: Causes serious eye irritation
- H336*: May cause drowsiness or dizziness
- H305*: May be harmful if swallowed and enters airways

**Supplemental Information**

*Code numbers for hazard and precautionary statements are optional.*

**Supplier Information**

United Nations Chemical Company Ltd.

1-1, Peace Avenue
Jurong Island Annex A, Singapore 123456

Contact number: 65 6000 0000
Emergency Contact number: 65 6123 4567

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Hazard Communication

Elements of Reduced Workplace Label

- **Product identifier (chemical name)**: EPICHLOROHYDRIN
- **Pictogram(s)**
- **Supplemental information (where practicable)**: Refer to SDS for additional information.

**Situations where workplace labelling can be adopted:**
- Decanted, transferred or dispensed from original product container to a working-sized container
Medical Examinations

Exposure to the following chemicals:

1. Fumes, dust or vapour of arsenic, cadmium, lead, manganese or mercury or any of their compounds;

2. Benzene, perchloroethylene, trichloroethylene, organophosphates or vinyl chloride monomer;

3. Tar, pitch, bitumen or creosote;

4. Dust of asbestos, raw cotton or silica;
Medical Examinations

• Monitor whether existing controls are effective

• Detect any excessive absorption of chemical

• Allow early detection of workers with occupational disease

• Ensures that workers remain fit for such work involving the chemical(s)
Heat Stress
What is Heat Stress?

Heat from external environment

Excess heat

Heat generated by body

Excess heat
Heat Stress Symptoms

Heat Cramps
- Earliest sign of heat stress
- Contraction of muscles
- Due to fluid and electrolyte losses from heavy perspiration

Heat Exhaustion
- Sensation of “feeling weak”
- Dizziness, headache, Fainting
- Perspire heavily and body temperature higher than normal

Heat Stroke
- Incoherent, unable to talk clearly, unconscious
- Perspiration mechanism may fail
- Body temperature rises
- Vital organs will be damaged and can result in death
Heat Stroke Cases - Findings

1. All males
2. 36 to 49 yrs
3. Construction workers
4. Working under hot sun
5. Collapsed in the afternoon between 1 & 4 pm
6. All were from countries with colder climate
7. All except one occurred from day 1 to day 5 of starting work (un-acclimatised)

8 cases of Heat Stroke (2007 -2010)
Heat Stroke (Hyperpyrexia)

- Body temp. (40 to 43 °C) (sweat diminished)
- Hot, dry, flushed (reddenning) skin
- Brain dysfunction
  - Irritability, delirium (excited) / disorientation, convulsion, coma

Death < 1 to 12 days,
Complications: liver & kidney failure, brain damage,...
Risk Factors

1. Un-acclimatized persons
2. Susceptible individuals
3. Body size / physical work capacity
4. Clothing

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 (Apr)</td>
<td>1 construction worker died</td>
</tr>
<tr>
<td>2009 (Jan to May)</td>
<td>1 construction worker had permanent brain damage</td>
</tr>
<tr>
<td></td>
<td>2 construction workers died</td>
</tr>
<tr>
<td></td>
<td>3 construction workers recovered</td>
</tr>
<tr>
<td>2010 (May)</td>
<td>1 construction worker had neurological impairment</td>
</tr>
</tbody>
</table>

Diseases caused by excessive heat is notifiable under the WSH Act
# Heat Stroke Cases - Summary

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Occupation</th>
<th>Day of work</th>
<th>Time of Incident</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 2007</td>
<td>39</td>
<td>Carpenter</td>
<td>D2</td>
<td>3.25 pm</td>
<td>Fatal</td>
</tr>
<tr>
<td>Jan 2009</td>
<td>42</td>
<td>Carpenter</td>
<td>D4</td>
<td>3.35 pm</td>
<td>Permanent brain damage</td>
</tr>
<tr>
<td>Feb 2009</td>
<td>22</td>
<td>Construction worker</td>
<td>D3</td>
<td>3 pm</td>
<td>Fatal</td>
</tr>
<tr>
<td>Apr 2009</td>
<td>49</td>
<td>Construction worker</td>
<td>D2</td>
<td>3 pm</td>
<td>Recovered</td>
</tr>
<tr>
<td>Apr 2009</td>
<td>46</td>
<td>Carpenter</td>
<td>2\textsuperscript{nd} month</td>
<td>2 pm</td>
<td>Recovered</td>
</tr>
<tr>
<td>Apr 2009</td>
<td>36</td>
<td>Construction worker</td>
<td>D2</td>
<td>2-3 pm</td>
<td>Fatal</td>
</tr>
<tr>
<td>May 2009</td>
<td>46</td>
<td>Construction worker</td>
<td>D4</td>
<td>3.50 pm</td>
<td>Recovered</td>
</tr>
<tr>
<td>May 2010</td>
<td>41</td>
<td>Carpenter - Construction worker</td>
<td>D5</td>
<td>4pm</td>
<td>Neurological impairment</td>
</tr>
</tbody>
</table>
## Prevention – Practicable Measures

<table>
<thead>
<tr>
<th>Follow acclimatisation schedule</th>
<th>Reduce heavy physical work</th>
<th>Wear light coloured, loose-fitting clothing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase rest period</td>
<td>Re-organise work</td>
<td>Drink 100 to 200 ml water frequently</td>
</tr>
<tr>
<td>Wear hat with brim</td>
<td>Work in shaded area</td>
<td>Provide cool shaded rest area</td>
</tr>
<tr>
<td>Wear tinted safety glasses / sunglasses</td>
<td>Stop working if feeling unwell</td>
<td>Observe healthy lifestyle</td>
</tr>
</tbody>
</table>

Credit: Images were obtained from internet sources
Heat Stroke Advisory to Employers

Increasing by 1 hour every day. For the rest of the day, they may be assigned to other tasks which does not require work under the direct sun. In addition, they should not be working under the direct sun during the hottest part of the day (11 a.m. to 3 p.m.) during their first 2 days of work. On the third day, they may be exposed for an hour, increasing by 1 hour every subsequent day. Example of a suitable acclimatization schedule is as follows:

![Example of acclimatization schedule](image)

*Assuming one hour lunch from noon to 1 pm.

Please note that the schedule above is for work under the sun. For the other times, the worker should not be working under direct sun. The timings can be adjusted to suit workers who may need a longer period to acclimatize.

2. During the period of acclimatization, workers should be closely supervised and given the flexibility to have more rest breaks or a longer acclimatization period if this is needed. Work targets should not be excessive. They should be monitored closely for symptoms of heat stroke and must report if they feel unwell during the acclimatization period.

3. Acclimatization is lost during periods when there is no exposure to heat stress. Workers returning from a prolonged leave (more than one week) should be re-acclimatized. Workers returning from prolonged illness should consult a doctor before going back to work; they should also be re-acclimatized.

Adequate water intake and drinking facilities

4. All workers must drink at least one bottle of water before starting work and also during lunch and/ or tea breaks. Supervised drinking or ‘water parades’ can help ensure this.

5. Workers must be provided with cool drinking water at convenient locations, close to their work areas. Frequent drinking must be encouraged, e.g. one glass or more every 15 to 20 mins.

Work schedule and provision of mechanical aids

6. Heavy physical work or work under the sun should be scheduled to the cooler parts of the day (early morning or late afternoon) where possible.
Heat Stroke Advisory to Employers

Example of acclimatization schedule

*Assuming one hour lunch from noon to 1 pm.*
Checklist for Prevention of Heat Disorders in the Construction Industry

For new workers and workers back from long leave

<table>
<thead>
<tr>
<th>Preventive measures</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acclimatization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are all new workers and those returning from colder climates acclimatized to work in the hot environment? (refer to the recommended acclimatization schedule)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient water intake and drinking facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a daily supervised water parade? (e.g. before starting work and/or during lunch or tea breaks)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with cool drinking water at convenient locations close to their work areas?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Work schedule</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wherever possible, is heavy physical work scheduled to the cooler part of the day? (the hottest period of the day is usually between 11 am and 3 pm)</td>
<td></td>
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<td>Are workers permitted to take short breaks particularly in very hot weather or heavy physical work? (e.g. 5 minutes rest after every 25 minutes of heavy or hot work?)</td>
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<td>Shaded areas for work and rest</td>
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<tr>
<td>Are workers provided with shaded areas where they can work or rest?</td>
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<tr>
<td><strong>Clothing in outdoor environment</strong></td>
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<tr>
<td>Do the workers wear loose-fitting and light-coloured clothing?</td>
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<tr>
<td><strong>Worker training and early reporting</strong></td>
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<tr>
<td>Have all workers been educated on the symptoms of heat-related disorders and the measures to take or observe before starting work?</td>
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<tr>
<td>Have all workers attended the Construction Safety Orientation Course (CSOC)?</td>
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WSH Guidelines on Managing Heat Stress in the Workplace
Ergonomics
Manual Handling

- Lifting heavy objects
- Jerk to lift an object off the floor
- Carrying objects by the straps or tapes
- Pushing and pulling of heavy machines
Consequences of Poor Ergonomics

Musculoskeletal Disorders

- Low back pain
- Neck and shoulder pain
- Carpal Tunnel Syndrome
- Cubital Tunnel Syndrome
- De Quervain’s Tenosynovitis
- Trigger finger
- Epicondylitis

Symptoms

- Numbness
- Pain
- Aches
- Burning sensation
- Swelling
- Tingling sensation
- Weakness
- Cramping
- Loss of colour

Credit: Images were obtained from internet sources
Risk Factors

1. Load/Force
2. Awkward posture
3. Repetitive movements
4. Vibration

Credit: Images were obtained from internet sources
MANUAL HANDLING

Correct postures
Preventive Measures

**Engineering control measures**
- Use of supporting devices such as hoists, trolleys and vacuum lifting devices

**Administrative measures**
- Job rotation
- Have a buddy to help
- Breaks of sufficient length
- Provide information on the risks and negative health effects of manual handling
- Training in the use of equipment and correct handling techniques

Credit: Images were obtained from internet sources
Hand - Arm Vibration

- Use of chain saws
- Raynaud’s Disease - White fingers

Preventive Measures

- Train workers on safe handling of equipment/tool
- Pad the handle of the chainsaw to reduce the impact of vibration
- Use ergonomically designed equipment/tool

Credit: Images were obtained from internet sources
Other Hazards - Biological

- Insect bite / attack
- Plant thorns

Preventive Measures

- Check for insect nests before starting work
- Engage pest control company to remove nests of bees, wasps and hornets
- Equip worker with protective clothing and hand protection
- If possible, spray insecticide to get rid of insects before working on the plant
Other Hazards - Biological

Contact with Plant Saps

- Furocoumarins (plant psoralens) from plant
- Contact with skin and UV radiation, may cause Photo-toxic Contact Dermatitis

Preventive Measures

- Worker education and training regarding specific job hazards
- Have good personal cleansing and hygiene practices
- Personal protective equipment

Credit: Images were obtained from internet sources
RESOURCES

Workplace Safety and Health Guidelines:
https://www.wshc.sg/wps/portal/resources
Useful Resources

• WSH Council’s webpage on NID/MHCP/Ergonomics
  – http://www.wshc.sg/nid
  – http://www.wshc.sg/chemicals
  – https://www.wshc.sg/cms/Ergonomics

• Singapore Standards e-shop
  – Search for “SS549”
  – Search for “CP99”
  – Search for “SS586”
Conclusion

Risk Assessment
(Hazard Identification, Evaluation & Control)

Develop and implement Workplace Health Programme
(Manage the hazards)

Health hazards can be controlled

Occupational Diseases can be prevented

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Thank You