

NATIONAL FARM INJURY DATA CENTRE

# *Occupational Health and Safety Risk Associated with Sugarcane Production*



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future



**National Farm Injury Data Centre**

**OCCUPATIONAL HEALTH AND  
SAFETY RISK ASSOCIATED WITH  
SUGARCANE PRODUCTION**

**Fragar LJ, Franklin RC, Allen C, Harding W**

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Occupational Health and Safety Risks associated with sugarcane production

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Researcher contact details:

R Franklin

Australian Centre for Agricultural Health and Safety

University of Sydney

PO Box 256

Moree NSW 2400

Phone: 02 6752 8215

Fax: 02 6752 6639

Email: [rfranklin@doh.health.nsw.gov.au](mailto:rfranklin@doh.health.nsw.gov.au)

RIRDC contact details:

Rural Industries Research and Development Corporation

Level 1, AMA House

42 Macquaries Street

Barton ACT 2600

PO Box 4776

Kingston ACT 2604

Phone: 02 6272 4539

Fax: 02 6272 5877

Email: [rirdc@rirdc.gov.au](mailto:rirdc@rirdc.gov.au)

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## Foreword

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While the different agricultural and horticultural industries share many occupational health and safety risks, their differing production processes are also associated with a range of risks that differ from each other.

This report is one of a series of profiles specific to a particular primary production industry that describe the OHS risks specific to that industry across Australia. It has been produced under the supervision of an industry Reference Group, convened by Farmsafe Australia to work with the National Farm Injury Data Centre to ensure that the profile addresses all known hazards associated with each phase of the production process, and that all relevant data is used.

These profiles are proving to be invaluable for the development of commodity specific guidance material for on-farm OHS risk management; for development of relevant guidance resources to control risks; for defining OHS training competencies and for defining information gaps that require further research.

The profile is a product of the National Farm Injury Data Collection project, funded by the research and development corporations contributing to the Farm Health and Safety Joint Venture - Rural Industries Research and Development Corporation, Grains Research and Development Corporation, Australian Wool Innovation Limited, Cotton Research and Development Corporation, Sugar Research and Development Corporation and Meat and Livestock Australia. The Joint Venture is committed to improving well-being and productivity of the agricultural industries through careful investment in research and development programs that assist industry to manage OHS risk in a cost effective way. This Profile is a key document that brings together all available information in the interests of the Sugarcane industry.

**Peter Core**

Managing Director

Rural Industries Research and Development Corporation

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## Executive Summary

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**Authors:** Fragar LJ, Franklin RC, Allen C, Harding W.  
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This profile has been prepared for the Sugarcane industry in Australia, with the aim to identify and assess the health and safety risks associated with work in the industry. This report will be useful for:

- Development of strategies and plans for reducing occupational health and safety (OHS) risk, and thence associated costs
- Development of guidance notes for producers and farm managers and supervisors responsible for ensuring the health and safety of workers
- Specification of OHS competency standards for guiding training activities.

The information will also be useful in the customisation of the Managing Farm Safety resource package or “tool” for the Sugarcane grower to use in the process of managing health and safety. Components of the package include;

- On-farm hazard identification checklists
- Induction information for workers and contractors
- Templates for health and safety records
- Guidance notes for the implementation of a safety program

## Introduction

This document has been prepared for the sugarcane producers of Australia to assist in the development of a Sugarcane Industry Occupational Health and Safety Strategy and Plan.

It aims to list the full range of potential hazards to human health and safety on sugarcane properties, and to provide information to assist producers and the industry in assessing the degree of risk associated with identified hazards. Such information will be useful in the development of a range of "tools" for sugarcane producers to use in the process of managing health and safety issues for workers on sugarcane farms, family members and visitors. Such tools include:

- Farm safety environmental audits
- Guidance notes for the implementation of a safety program
- Induction and training of workers
- Health and safety records

The document has been assembled by a large working group with representation from each of the sugarcane producers in each state. The information has taken account of:

- Identified hazards to health and safety on sugarcane farms
- The severity of injury or illness as indicated by risk of death and permanent disability
- The frequency of injury or illness or exposure risk
- The costs associated with injury and illness
- The requirement to meet relevant occupational health regulations in relation to control of risk

## The sugarcane industry

The sugarcane industry is a major agricultural industry in Australia. Table 1 indicates the number of establishments reporting sugarcane production by state for the year 1996 - 97.

**Table 1: Value of production, area and number of sugarcane production 1996/97.**

State	Value of Production (\$'000)	Area (HA)	Number of sugarcane enterprises	Percent of sugarcane enterprises
Queensland	1,111,954	371,238	4,807	90.4
New South Wales	71,565	179,728	499	9.4
Western Australia	2,912	1,029	13	0.2
<b>Total</b>	<b>1,186,431</b>	<b>390,239</b>	<b>5,319</b>	<b>100.0</b>

The value of production was \$1.19 billion for the 1996/97 financial year.

## Health and safety record of the industry

There is only a small amount of documented information available to assist in precisely defining the nature and scale of injury and illness associated with sugarcane production on



farms. Key sources are listed in the Key References list below.

## 1. Deaths

Between 1989 and 1992, there were 12 fatalities on Australian sugar cane farms. This is an average of three fatalities per year. Of the 12 fatalities on sugar cane farms, eleven (91.7%) were of persons working at the time of the incident and one (8.3%) was of a bystander (Franklin et al, 2000 p104).

Paddocks (4: 33.3%), all under crop, and roads and lanes (4: 33.3%) were the most common locations of working fatal incidents related to sugar cane farms. The fatality of the bystander occurred on a road or lane (Table 2).

**Table 2: Location on farm by work status, sugar cane, farm-related fatalities, Australia, 1989-1992**

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	-	4	33.3
Natural Vegetation	1	-	1	8.3
Roads, Lanes	4	1	5	41.7
Machinery Shed	1	-	1	8.3
Farm House	1	-	1	8.3
<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>	<b>100.0</b>

Source: Franklin et al 2000, p105

The most common activities of workers at the time of the fatal incidents were working with crops (3: 27.3%), transport for work purposes, maintenance activities, and monitoring, observing or inspecting (each with 2: 18.2%) (Table 3). The bystander was fatally injured while engaged in transport.

**Table 3: Activity at time of fatal incident by work status, sugar cane, farm-related fatalities, Australia, 1989-1992**

Activity	Working	Bystander	Total	%
Transport for Work Purposes	2	-	2	18.2
Transport for Recreation	-	1	1	9.1
Maintenance	2	-	2	18.2
Earthmoving or Digging	1	-	1	9.1
Felling Trees or Clearing Land	1	-	1	9.1
Working with Crops	3	-	3	27.3
Monitoring, Observing, Inspecting	2	-	2	18.2
<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>	<b>100.0</b>

Source: Franklin et al, 2000, p106

The most common agent involved in working incidents related to sugar cane farms was a tractor, and all such incidents were due to rollovers (5: 45.5%). The bystander fatality occurred due to a vehicle accident involving a two-wheel motorcycle (Table 4).

**Table 4      Agent of fatal incident by work status, sugar cane, farm-related fatalities, Australia, 1989-1992**

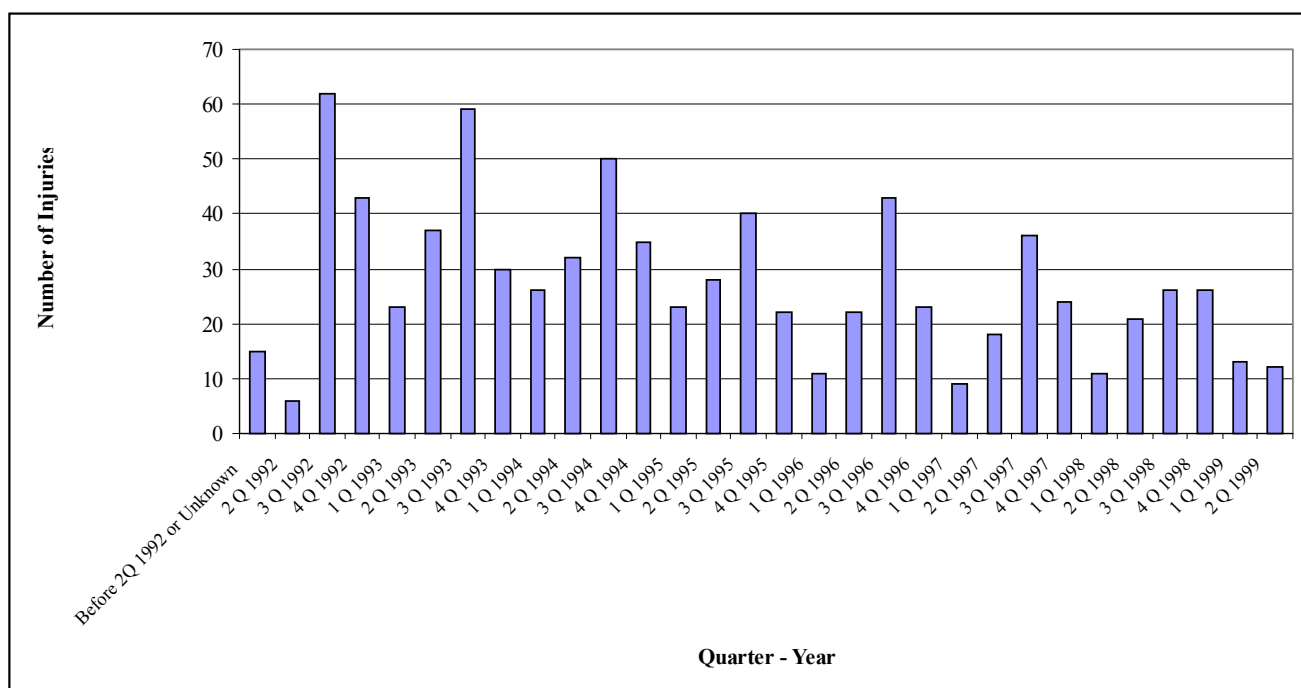
Agent	Working	Bystander	Total	%
<b>Farm Vehicles</b>				
Truck	1	-	1	8.3
Motorcycle 2 Wheel	-	1	1	8.3
Motorcycle 3 Wheel	1	-	1	8.3
<b>Total Farm Vehicles</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>25.0</b>
<b>Mobile Farm Machinery and Plant</b>				
Tractor	5	-	5	41.7
Tillage Seeder	1	-	1	8.3
Slasher	1	-	1	8.3
<b>Total Mobile Farm Machinery and Plant</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>58.3</b>
<b>Materials</b>				
Steel	1	-	1	8.3
<b>Total Materials</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>8.3</b>
<b>Farm Structures</b>				
Powerlines	1	-	1	8.3
<b>Total Farm Structures</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>8.3</b>
<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>	<b>100.0</b>

Source: Franklin et al, 2000, p105

## ***2. Injury associated with workers compensation claims***

Between 1 July 1992 and June 1999, there were 826 injuries reported to workers compensation in Queensland (this does not include those who are self insured). Of these 21 occurred before July 1992 or the date of incident was unknown. Through out the period examined the 3<sup>rd</sup> Quarter (July - September) had consistently more injuries than any other quarter (Figure1). This equated to 118 injuries per year or an injury every three days on a sugarcane property in Queensland.

**Figure 1. Number of workers compensation injuries by quarter 1992-1999  
(N=826)**



Source: Queensland Workers Compensation July 1992 - June 1999

Of the 826 injuries in the sugar cane industry reported to Queensland workers compensation 24% (198) were from mobile plant and transport, more specifically tractors (81: 9.8%). There were however 177 (21.4%) cases where the agent was not apparent. Table 5 displays information about the agent group involved and the agents with the larger numbers.

**Table 5. Grouping of agents and common agents within the groups, Sugarcane, Queensland Workers Compensation 1992-1999.**

Agent Group / Agent	Frequency	Percent
<b>Machinery and (Mainly) Fixed Plant</b>	<b>30</b>	<b>3.6</b>
Conveyor belts and escalators	4	0.5
Water mains, pipes, valves, hydrants, taps, etc	4	0.5
<b>Mobile Plant and Transport</b>	<b>198</b>	<b>24.0</b>
Self-propelled harvesters	22	2.7
Compressors, pumps	4	0.5
Tractors, agricultural or otherwise	81	9.8
Ploughs, harrows, cultivators	17	2.1
Trailers, caravans	15	1.8
Trucks, semi-trailers, lorries	17	2.1
Cars, station wagons, vans, utilities	6	0.7
Motorcycles and sidecars, scooters, trail-bikes	6	0.7
Railway, tramway lines (track and other fixtures)	8	1.0
Trains	7	0.8
<b>Powered Equipment tools and appliances</b>	<b>29</b>	<b>3.5</b>
Abrasive, planing, cutting powered tools	7	0.8
Arc welding equipment	6	0.7
Chainsaws	4	0.5

**Table 5. Grouping of agents and common agents within the groups, Sugarcane, Queensland Workers Compensation 1992-1999. Con't**

<b>Agent Group / Agent</b>	<b>Frequency</b>	<b>Percent</b>
<b>Non-powered Hand tools, appliances and equipment</b>	<b>102</b>	<b>12.3</b>
<i>Knives and cutlery</i>	14	1.7
<i>Scythes, slashers, sickles</i>	6	0.7
<i>Hammers, mallets</i>	8	1.0
<i>Wrenches, spanners, sockets</i>	9	1.1
<i>Crowbars, pinchbars, jemmies</i>	4	0.5
<i>Manual lifting equipment</i>	4	0.5
<i>Wire, wire rope, metal strapping</i>	6	0.7
<i>Crates, cartons, boxes, cases, drums, kegs, barrels</i>	8	1.0
<i>Ladders, mobile ramps and stairways</i>	4	0.5
<b>Chemicals and Chemical Products</b>	<b>17</b>	<b>2.1</b>
<i>Plant treatment chemicals</i>	9	1.1
<b>Materials and Substances</b>	<b>124</b>	<b>15.0</b>
<i>Rocks, stones, boulders</i>	11	1.3
<i>Sawn or dressed timber</i>	6	0.7
<i>Ferrous and non-ferrous metal</i>	52	6.3
<i>Fragments</i>	12	1.5
<i>Food and beverages</i>	8	1.0
<b>Environmental Agencies</b>	<b>122</b>	<b>14.8</b>
<i>Holes in the ground</i>	9	1.1
<i>Traffic and ground surfaces with hazardous objects</i>	12	1.5
<i>Traffic and ground surfaces other</i>	34	4.1
<i>Vegetation</i>	48	5.8
<i>Steps and stairways</i>	5	0.6
<b>Animal, Human and Biological Agencies</b>	<b>23</b>	<b>2.8</b>
<i>Horses, donkeys, mules</i>	5	0.6
<b>Other and Unspecified Agencies</b>	<b>181</b>	<b>21.9</b>
<i>Agency not apparent</i>	177	21.4
<b>Total</b>	<b>826</b>	<b>100.0</b>

Source: Queensland Workers Compensation July 1992 - June 1999

The total number of days people were absent from work due to an injury was 22,845 over the seven years or 3,263 days per year. The number of days absent ranged from 0 to 491 days with an average per injury of 27 days. The total days absent from work in groups is shown in Table 6.

**Table 6. Total days absent from work, Sugarcane, Queensland Workers Compensation 1992-1999**

<b>Total Days absent from work</b>	<b>Frequency</b>	<b>Percent</b>
<1 Day	227	27.5
1-5 Days	152	18.4
6-10 Days	95	11.5
11-20 Days	115	13.9
21-40 Days	99	12.0
41+ Days	138	16.7
<b>Total</b>	<b>826</b>	<b>100.0</b>

Source: Queensland Workers Compensation July 1992 - June 1999

The total cost (all costs incurred by the employee from their injury including compensation payouts) of injuries reported to Queensland Workers Compensation over the seven years was \$3,851,346 or \$550,000 per year. The cost of injuries ranged from \$0 to \$262,985 and the average cost per injury \$4,662.65. Table 7 displays information on the cost of an injury. For the majority of injuries (438: 53.0%), the total cost was less than \$1,000.

**Table 7: Total cost of an injury, Sugarcane, Queensland Workers Compensation 1992-1999**

Cost of Injury	Frequency	Percent
\$0-\$999	438	53.0
\$1,000-\$4,999	233	28.2
\$5,000-\$9,999	73	8.8
\$10,000-\$49,999	70	8.5
\$50,000+	12	1.5
<b>Total</b>	<b>826</b>	<b>100</b>

Source: Queensland Workers Compensation July 1992 - June 1999

### ***3. Injury reported by sugarcane farmers.***

A study of farm injury in Queensland for the period February 1994 – January 1995 by Ferguson reported 63 injuries on sugarcane farms (Ferguson, 1996). This represented 12 injuries per 100 sugarcane farms for the 12 months.

The location on farms where the injury occurred is displayed in Table 8.

**Table 8: Place of occurrence of injury on sugarcane farms Feb 1994-Jan 1995**

Place of occurrence	Number reported
Workshop	18
Other structure	5
Paddock	32
<b>Total</b>	<b>63</b>

Source: Ferguson, 1996.

Table 9 indicates the agency of injury for 63 injuries reported on sugarcane farms by Ferguson (1996) for a 12-month period February 1994 – January 1995.

**Table 9: Agent of injury on sugarcane farms Feb 1994-Jan 1995**

Agent of injury	Number reported
Motorcycle	3
Tractor	5
Other farm machine	4
Other plant	4
Grinder	3
Other workshop equipment	3
Hand equipment	7
Pesticide	4
Timber/post	1
Ground covers/Other obstacles	4
Other	1
Acts of a person	16
<b>Total</b>	<b>63</b>

Source: Ferguson, 1996.

#### 4. Zoonoses

Cases of leptospirosis continue to be reported among sugarcane workers. Transmission is associated with Table 10 indicates the cases of leptospirosis reported according to industry for the 18 months January 1998 to June 1999.

**Table 10: Notifications of leptospirosis, Queensland and Australia, 1 January 1998 to 30 June 1999, by occupation or activity**

Occupation or activity	Notifications for Queensland		Notifications for Australia	
	Number	%	Number	%
Banana farmers	74	25.3	74	19.4
Meatworkers	36	12.3	67	17.6
Dairy farmers	25	8.6	43	11.3
Children/students	20	6.8	20	5.2
Farmers	15	5.1	20	5.2
Agricultural/rural workers	10	3.4	10	2.6
Cane farmers	9	3.1	9	2.4
Graziers	9	3.1	11	2.9
Building labourers	8	2.7	8	2.1
Transport workers	7	2.4	7	1.8
Station hands	6	2.1	9	2.4
Home duties	4	1.4	4	1.0
Nursery worker/landscaper	4	1.4	4	1.0
Tradesperson	4	1.4	5	1.3
White water rafting guides	4	1.4	4	1.0
Unemployed	4	1.4	5	1.3
Mechanic	3	1.0	4	1.0
Clerical duties	3	1.0	3	0.8
Retired	2	0.7	3	0.8
Tourist	2	0.7	4	1.0
Other	28	9.6	32	8.4
Unknown	15	5.1	35	9.2
<b>Total</b>	<b>292</b>	<b>100</b>	<b>381</b>	<b>99.7</b>

Source: Smythe et al. CDI 2000

### **5. Costs of injury/illness in sugarcane enterprises**

Ferguson's survey of farm injury (Ferguson, 1996) reported that of the 63 injuries reported in the 12 month period on sugarcane farms, 24 were associated with loss of farm production, 2 with damage to equipment or machinery and in 9 cases extra staff had to be hired as a result of the injury. The overall average cost of each injury was \$1117 (range 794-1440).

Workers compensation costs over the seven years 1 July 1992 to 30 June 1999 was \$3,851,346 or over \$550,000 per year. The average cost per injury was \$4,662.64 and cost ranged from \$0 to \$262,985. Table 7 displays information about cost.

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9. Industry experience



## National Sugarcane Production Processes and OHS Hazards

(Notes: 1. Not all cane farms will present all hazards  
2. Hazards associated with production of other commodities are being defined elsewhere)

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
Ground preparation	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runover/ fumes	■■■■■	■■■■■ (1,3a,4)	☠ ☠ ☠ ☠	Ground preparation may include laser levelling, discing, rotary hoeing, ripping, marking out and furrowing
	Noise	Operator	Noise induced hearing loss	■■□□□	■■■■■ (1,7)	☠ ☠ ☠ ☠	
	Implements	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, lacerations, contusions, burns, skin penetration	■■■□□	■■■■■ (1)	☠ ☠ ☠ ☠	Rotary hoe and discs are main risk sources. Skin penetration injuries may occur from burst hydraulic oil lines Includes hitching
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■■■■■	■■□□□ (1)	☠ ☠ ☠ ☠ ☠	
	Slips, trips, falls	Operator	Sprains, strains, fractures to ankles, feet, back, wrists, or limbs	■■□□□	■■■■■ (1)	☠ ☠ ☠	
	Dusts / particles	Operator, bystanders	Foreign body in eye, respiratory effects including asthma, Toxic Organic Dust Syndrome (TODS)	■■■□□	■■□□□ (1)	☠ ☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■■■■■	■■■■■□ (1,3a)	☠ ☠ ☠ ☠ ☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■■■■■	■■■□□ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	UV/solar radiation	Operator	Sunburn, skin cancer, dehydration, heat stress	■■■□□	■■■□□ (1)	☠ ☠ ☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
	Snakes, rats, wild pigs	Operator	Envenomation, bites, Leptospirosis	■ ■ ■ □ □		☠ ☠ ☠	
Planting	Whole stalk cane harvester	Operator bystanders	Crush injury, lacerations, fractures	■ ■ ■ ■ □	1	☠ ☠ ☠ ☠	
	Chopper harvester	Operator bystanders	Crush injury, lacerations, fractures, amputations	■ ■ ■ ■ □		☠ ☠ ☠ ☠	
	Billet planter	Operator, bystanders	Crush injury, lacerations	■ ■ ■ □ □		☠ ☠ ☠	
	Whole stalk planter	Operator bystanders	Crush injury, lacerations	■ ■ ■ □ □		☠ ☠ ☠	
	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runover	■ ■ ■ ■ ■	■ ■ ■ ■ ■ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	Implements	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, lacerations, contusions	■ ■ ■ □ □	■ ■ ■ ■ ■ (1)	☠ ☠ ☠ ☠	Includes hitching
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■ ■ ■ ■ ■	■ ■ □ □ □ (1)	☠ ☠ ☠ ☠ ☠	
	Pesticides includes insecticides and fungicides	Operator during mixing and application, bystanders	Acute toxicity depending on chemical, unknown long term effects  Burns depending on nature of chemical	■ ■ ■ □ □ (Depending on toxicity)	■ ■ ■ □ □ (4)	☠ ☠ ☠	
	Bending, lifting, twisting	Operator	Back injury, musculoskeletal strain / sprain	■ ■ ■ □ □	■ ■ ■ ■ ■ (1,4)	☠ ☠ ☠	Preparation for planting may include lifting of plastic irrigation fluming
	Slips, trips, falls	Operator	Sprains, strains, fractures to ankles, feet, back, wrists	■ ■ □ □ □	■ ■ ■ ■ ■ (1)	☠ ☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
	Dusts / particles	Operator, bystanders	Foreign body in eye, respiratory effects including asthma, Toxic Organic Dust Syndrome (TODS)	■ ■ □ □ □	■ ■ □ □ □ (1)	☠ ☠	
	Noise associated with all mechanical equipment	Operator	Noise induced hearing loss	■ ■ □ □ □	■ ■ ■ ■ ■ (1,7)	☠ ☠ ☠ ☠	
	Snakes, rats	Operator	Envenomation, bites, Leptospirosis	■ ■ ■ □ □		☠ ☠ ☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■ ■ ■ ■ ■	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠ ☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■ ■ ■ ■ ■	■ ■ ■ □ □ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	UV/solar radiation	Operator	Sunburn, skin cancer, dehydration	■ ■ ■ □ □	■ ■ ■ □ □ (1)	☠ ☠ ☠	
Crop maintenance – monitoring, checking	Manual handling – bending, lifting, twisting	Operator	Back injury, musculoskeletal strain / sprain	■ ■ ■ □ □	■ ■ ■ ■ ■ (1,4)	☠ ☠ ☠	Exposure occurs whilst taking soil samples, checking soil moisture
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■ ■ ■ ■ ■	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠ ☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■ ■ ■ ■ ■	■ ■ ■ □ □ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	Slips, trips, falls	Operator	Sprains, strains, fractures to ankles, feet, back, wrists	■ ■ □ □ □	■ ■ ■ ■ ■ (1)	☠ ☠ ☠	
	UV/solar radiation	Operator	Sunburn, skin cancer, dehydration	■ ■ ■ □ □	■ ■ ■ □ □ (1)	☠ ☠ ☠ ☠	
Crop maintenance –	Tractor	Operator, passengers,	Death / crush injury from rollover,	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☠ ☠ ☠ ☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
soil management		bystanders	runover		(1,3a,4)		
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■■■■■	■■□□□ (1)	☠☠☠☠☠	
	Implements	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, lacerations, contusions	■■■□□	■■■■■ (1)	☠☠☠☠	Includes hitching
	Noise associated with all mechanical equipment	Operator	Noise induced hearing loss	■■□□□	■■■■■ ( 1,7)	☠☠☠☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■■■■■	■■■■■□ (1,3a)	☠☠☠☠☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■■■■■	■■■□□ (1,3a,4)	☠☠☠☠☠	
Crop maintenance, irrigation	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runover	■■■■■	■■■■■ (1,3a,4)	☠☠☠☠☠	
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■■■■■	■■□□□ (1)	☠☠☠☠☠	
	Implements	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, lacerations, contusions	■■■□□	■■■■■ (1)	☠☠☠☠	Implements include slashers used for mowing headlands, irrigation banks Irrigation equipment may include winch and boom spray Includes hitching
	Irrigation wells	Operators, bystanders	Falls, suffocation, drowning	■■■■■		☠☠☠☠☠	
	Irrigation pumps	Operator	Crush injury, hands	■■■□□		☠☠☠	Drive belt and pulley guards often not in place
	Snakes, rats	Operator	Envenomation, bites, Leptospirosis	■■■□□		☠☠☠	
	Power lines	Operator	Electrocution	■■■■■		☠☠☠☠☠	Moving irrigation pipes
	Noise associated	Operator	Noise induced	■■□□□	■■■■■	☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
	with all mechanical equipment		hearing loss		( 1,7)		
	Manual handling, other – bending, lifting, twisting	Operator	Back injury, musculoskeletal strain / sprain	■■■■□□	■■■■■ (1,4)	☠☠☠	
	Slips, trips, falls	Operator	Sprains, strains, fractures to ankles, feet, back, wrists	■■□□□	■■■■■ (1)	☠☠☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■■■■■	■■■■□ (1,3a)	☠☠☠☠☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■■■■■	■■■■□□ (1,3a,4)	☠☠☠☠☠	
	UV/solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■■□□	■■■■□□ (1)	☠☠☠☠	
Crop maintenance - fertilising	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runover	■■■■■	■■■■■ (1,3a,4)	☠☠☠☠☠	
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■■■■■	■■□□□ (1)	☠☠☠☠☠	
	Implements	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, lacerations, contusions	■■■■□□	■■■■■ (1)	☠☠☠☠	Includes Bin Lifter, which may be used in shed or towed to field locations where delivery of bulk fertiliser may be made by arrangement with supplier Includes hitching
	Bulk fertiliser / Fertiliser store	Operator, Bystander	Death / crush injury from unstable stacks or lost load Asthma in sensitive people	■■■■■		☠☠☠☠☠	Bulk fertiliser in 1 tonne bags may be stored in shed or delivered fresh to various field locations
	Auger	Operator	Death, amputation hands, toes, feet	■■■■■		☠☠☠☠☠	
	Noise associated with all	Operator	Noise induced hearing loss	■■□□□	■■■■■ ( 1,7)	☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
	mechanical equipment						
	Fertiliser in smaller bags	Operator	Back injury, strains & sprains Asthma in sensitive people	■■■■□□	■■■■■ (1)	☠☠☠	
	Anhydrous Ammonia	Operator, bystander	Death / Explosion / Asphyxiation Burns, internal, skin and eyes	■■■■■		☠☠☠☠☠	
	Bending, lifting, twisting	Operator	Back injury, musculoskeletal strain / sprain	■■■■□□	■■■■■ (1,4)	☠☠☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■■■■■	■■■■■□ (1,3a)	☠☠☠☠☠☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■■■■■	■■■■□□ (1,3a,4)	☠☠☠☠☠	
Crop maintenance – pest control	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runaway	■■■■■	■■■■■ (1,3a)	☠☠☠☠☠	
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■■■■■	■■□□□ (1)	☠☠☠☠☠	
	Implements	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, lacerations, contusions	■■■■□□	■■■■■ (1)	☠☠☠☠	Includes hitching
	Aircraft	Aerial operator	Death, serious injury	■■■■■ (3)	■■■■■ (3)	☠☠☠☠☠	
	Pesticides Insecticides Herbicides Fungicides	Operator during mixing and spraying; Bystanders	Acute toxicity depending on chemical, unknown long term effects Burns	■■■■□□ (Depending on toxicity)	■■■■□□ (4)	☠☠☠	Headlands – common use of Roundup, Diurex Aerial spraying – 2-4D, carbaryl Rat poison

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
			depending on nature of chemical				
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■■■■■	■■■■■□ (1,3a)	☠☠☠☠☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■■■■■	■■■■□□ (1,3a,4)	☠☠☠☠☠	
Cane firing	Bending, lifting, twisting	Operator	Back injury, musculoskeletal strain / sprain	■■■■□□	■■■■■ (1,4)	☠☠☠	Lifting irrigation fluming, pushing fire breaks between rows of cane
	Cane fire	Operators	Death / severe or minor burns	■■■■■	■■■■□□ (1)	☠☠☠☠☠	Often involves 4 workers, requiring each to know where the others are and what sequence is to be followed. Fuel is usually 50-50 diesel and petrol, but mix may vary.
	Smoke	Passers-by, particularly road traffic	Death or serious injury from motor vehicle collision; eye and respiratory irritation	■■■■■	■■■■□□ (1)	☠☠☠☠☠	Could conceivably cause extreme hazard to motorists if visibility at intersection or rail crossing is affected by smoke
	“Floaters”	Operators, bystanders, neighbours	Death / severe or minor burns	■■■■■		☠☠☠☠☠	Changing wind direction, or burning airborne pieces, known as “floaters”, may cause unintended fire in an adjacent or neighbouring field.
	Wildlife fleeing the fire	Operators, bystanders	Minor burns, minor injury	■■□□□		☠☠	Through collision or avoidance or distraction. May be bandicoots, wallabies, rats, birds
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■■■■■	■■■■■□ (1,3a)	☠☠☠☠☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■■■■■	■■■■□□ (1,3a,4)	☠☠☠☠☠	
Harvesting	Cane harvester	Operator	Amputation / crush injury from moving parts	■■■■■□	■■■■■ (1)	☠☠☠☠☠	Risks are increased when harvesting after dark

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
			Burns from unit fires				
	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runover	■■■■■	■■■■■ (1,3a,4)	☠☠☠☠	
	In-field transporters	Operator, passers-by, bystanders	Death, crush injury, fractures from collision, runover	■■■■■	■■■□□ (1)	☠☠☠☠☠	
	Haul-outs within field	Operator during in-field interruption, routine maintenance . Passengers.	Death / Crush injury, fractures, lacerations, contusions	■■■■■	■■■□□ (1)	☠☠☠☠☠	
	Road traffic	Haul-out driver, and vehicle drivers and passengers	Death / Crush injury, fractures, lacerations, contusions	■■■■■		☠☠☠☠☠	
	Trains	Haul-out and vehicle drivers, passengers	Crush injury, lacerations, fractures	■■■■□	■■■□□ (1)	☠☠☠☠	Collision with vehicles. Trains include mill locos pulling cane bins, full or empty, on cane railways, as well as some locations where interface occurs with Queensland Rail movements.
	Noise	Operator	Noise induced hearing loss	■■□□□	■■■■■ (1,7)	☠☠☠☠	
	Dusts / particles	Operator, bystander	Foreign body in eye, respiratory effects including asthma	■■□□□	■■□□□ (1)	☠☠	? Check generation of organic dust
	Power lines	Operator	Electrocution	■■■■■	■■■□□ (1,3a)	☠☠☠☠☠	
	Drains, culverts, water cylinders, power poles	Operators of plant and vehicles	Death / serious injury from vehicle accidents	■■■■■		☠☠☠☠☠	Water cylinders are the above-ground vertical concrete pipes into which water is pumped to



Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
	associated with traffic ways						provide a head of water for irrigation or fire fighting.
	Loose billets at siding, elsewhere	Operator	Sprains, strains, fractures to ankles, feet, back, wrists	■ ■ ■ □ □		☠ ☠ ☠	Falls
	Slips, trips, falls	Operator	Sprains, strains, fractures to ankles, feet, back, wrists	■ ■ □ □ □	■ ■ ■ ■ ■ (1)	☠ ☠ ☠	
	Snakes, rats	Operator	Envenomation, bites, Leptospirosis	■ ■ ■ □ □		☠ ☠ ☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■ ■ ■ ■ ■	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠ ☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■ ■ ■ ■ ■	■ ■ ■ □ □ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	UV/solar radiation	Operator	Sunburn, skin cancer, dehydration	■ ■ ■ □ □	■ ■ ■ □ □ (1)	☠ ☠ ☠ ☠	
Trash management	Tractor	Operator, passengers, bystanders	Death / crush injury from rollover, runover	■ ■ ■ ■ ■	■ ■ ■ ■ ■ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	Implements – slashers, cultivators	Operator during in-field interruption & routine maintenance. Passengers.	Crush injury, amputations, lacerations, contusions	■ ■ ■ □ □	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠	Includes hitching
	PTO	Operator, bystander	Death / amputation of fingers, limbs	■ ■ ■ ■ ■	■ ■ □ □ □ (1)	☠ ☠ ☠ ☠ ☠	
	Noise associated with all mechanical equipment	Operator	Noise induced hearing loss	■ ■ □ □ □	■ ■ ■ ■ ■ (1,7)	☠ ☠ ☠ ☠	
	Fire and smoke	Operator, bystanders	Burns /suffocation / respiratory irritation	■ ■ ■ □ □	■ ■ ■ □ □ (1)	☠ ☠ ☠	
	Dusts / particles	Operator,	Foreign body in	■ ■ □ □ □	■ ■ □ □ □	☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity of Risk	Frequency of reported injury	Risk rating	Comments
		bystanders	eye, respiratory effects including asthma, Toxic Organic Dust Syndrome (TODS)		(1)		
	Slips, trips, falls	Operator	Sprains, strains, fractures to ankles, feet, back, wrists	■ ■ □ □ □	■ ■ ■ ■ ■ (1)	☠ ☠ ☠	
	Snakes, rats	Operator	Envenomation, bites, Leptospirosis	■ ■ ■ □ □		☠ ☠ ☠	
	Motor vehicles – cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■ ■ ■ ■ ■	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠ ☠	
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■ ■ ■ ■ ■	■ ■ ■ □ □ (1,3a,4)	☠ ☠ ☠ ☠ ☠	
	UV/solar radiation	Operator	Sunburn, skin cancer, dehydration	■ ■ ■ □ □	■ ■ ■ □ □ (1)	☠ ☠ ☠ ☠	
Other general year round farm activities	Motor vehicle accidents, cars, utilities, trucks	Operator, passengers, bystanders	Death, serious injury	■ ■ ■ ■ ■	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠ ☠	Includes transport of farm supplies and children to and from bus stops
	Motor cycles, including 2 and 4 wheel ATV's	Operator, passengers	Death/ serious injury	■ ■ ■ ■ ■	■ ■ ■ □ □ (1,3a,4)	☠ ☠ ☠ ☠ ☠	During general farm activity and leisure activity
	Horses	Rider, bystanders	Death, head injury, crush injury	■ ■ ■ ■ ■	■ ■ □ □ □ (1,3a)	☠ ☠ ☠ ☠ ☠	Leisure activity
	Mowers, slashers	Operators, bystanders	Amputation/ Lacerations	■ ■ ■ ■ □	■ ■ ■ ■ □ (1,3a)	☠ ☠ ☠ ☠	General grass control and clearing headlands, revegetation
	Auger	Operator	Amputation / Lacerations to upper limbs	■ ■ ■ ■ □		☠ ☠ ☠ ☠	May be used in revegetation / tree planting

## MACHINERY, EQUIPMENT MAINTENANCE

Workshop activities	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Comments
Power tools	Electricity	Workers, helpers	Electric shock, death	■■■■■	?	☠☠☠☠	
	Flying steel fragments from grinders	Workers, bystanders	Steel fragments in eye	■■□□□	■■■■■	☠☠☠☠	
	Saws - bench, portable	Workers	Lacerations, contusions	■■□□□	?	☠☠☠	
	Angle grinders - heat	Workers	Lacerations, contusions, burns	■■■□□	?	☠☠☠	
Hand tools	Contact with hands, fingers	Workers	Crush injury hands, fingers	■■□□□	■■■□□	☠☠☠	
Welding	Oxyacetylene explosion	Workers, bystanders	Burns, penetrating injury	■■■■■	?	☠☠☠☠	
	Welding arc	Workers, bystanders	Flash burns to eyes, skin	■■□□□	■■■■■	☠☠☠☠	
	Welding fumes	Workers, bystanders	Toxicity	■■■□□	?	☠☠☠	
Air compressors	Explosion	Workers, bystanders	Penetrating injury	■■■■■	?	☠☠☠☠	
Tyre repair	Explosion	Workers, bystanders	Penetrating injury	■■■■■	?	☠☠☠☠	
	Failure of chocks and jacks	Workers	Crush injury, death	■■■■■	■■■□□	☠☠☠☠☠	
Hoists	Failure	Workers	Crush injury, death	■■■■■	?	☠☠☠☠☠	
Chemicals	Solvents	Handlers	Skin conditions Toxicity	■■■□□	?	☠☠☠	
	Petroleum products	Handlers	Skin conditions Toxicity	■■■□□	?	☠☠☠	
Firearms	Accidental/	Workers, others	Penetrating injury,			☠☠☠☠☠	

Workshop activities	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Comments
	intentional discharge		death	■■■■■	■■■■■		
General workshop hazards	Noise	Workers, bystanders	Noise induced hearing loss	■■□□□	■■■■■	☠☠☠☠	
	Storage areas	Workers	Back strain, musculoskeletal injury	■■□□□	?	☠☠☠☠	
	Slips, trips and falls	Workers	Sprains, strains, fractures of ankles, wrists, back, feet	■■■□□	?	☠☠☠	Fractures more likely in older people
	Bench, working areas	Workers	Back, musculoskeletal injury	■■□□□	?	☠☠☠	

**NOTES :**

- \* Risk of injury is increased during peak activity times
- \* Risk is increased when undertaking night work
- \* Fatigue increases risk of injury
- \* Alcohol, illegal drugs and medications use will increase risk of injury