NATIONAL FARM INJURY DATA CENTRE

Occupational Health and Safety Risks Associated with Horticultural Produce Production

shaping the future

Farm Health & Safety Joint Research Venture

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AUSTRALIAN CENTRE FOR AGRICULTURAL HEALTH AND SAFETY

National Farm Injury Data Centre

OCCUPATIONAL HEALTH AND SAFETY RISKS ASSOCIATED WITH HORTICULTURAL PRODUCE PRODUCTION

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Foreword

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 sheep and wool production industries.

PETER CORE
Managing Director
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Acknowledgements

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Executive Summary

Title: Occupational Health and Safety Risks Associated with Horticulture Produce Production
Authors: Franklin RC, Brown P, Fragar LJ, Houlahan JB
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This profile has been prepared for the horticultural (fruit, vegetables, nuts and flowers) 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 horticultural grower to use in the process of managing health and safety. Components of the package include;

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

It should be noted that risk management of farm hazards is an essential part of compliance with state occupational health and safety legislation.

An overview of health and safety in the horticultural industry

Occupational health and safety within agriculture needs dramatic improvement. Agriculture is ranked the second most dangerous occupation in Australia, with the mining industry being first. Statistics have shown that there is one work related fatality every four days in Australian agriculture. Also there were 6700 work related injury/diseases claimed on workers' compensation in the financial year of 1992/93. These statistics should alarm everyone within the industry and methods of control should be incorporated by all agricultural employers.

This profile was developed over a six month period where injury data was collected on the horticultural industry. The collection of data identified large gaps within the agricultural industry, with very little or no commodity specific information. The study used 17 different resources to compile the data. Although a large number of resources were used, the content of available material was not exhaustive and industry knowledge was heavily relied on. A reference list has been included to allow the reader to cross reference how frequency ratings were established.

Horticulture injury statistics

1. DEATHS

The following information on fatalities in agriculture has been reproduced from Franklin et al (2000).

ORCHARD AND OTHER FRUIT

Between 1989 and 1992, there were 20 fatalities related to Australian orchard and other fruit farms. This is an average of five fatalities per year. Of the 20 fatalities related to orchard and other fruit farms, ten (50.0%) were of persons working at the time of the incident and ten (50.0%) were of bystanders.

Location of Fatal Incident

Paddocks (9: 45%), mainly those under crop, and dams (5: 25%) were the most common locations of fatal incidents related to orchard and other fruit farms. Paddocks (5: 50%) were the main location for working incidents, while dams (5: 50%) and paddocks (4: 40%) were the main locations for bystander incidents (Table 1).

Table 1 Location on farm by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	4	8	40.0
Paddock Clear for Grazing	1	-	1	5.0
Workshop	1	-	1	5.0
Roads, Lanes	1	1	2	10.0
Dam, Water Reservoir, Irrigation Channel	-	5	5	25.0
Sorting / Packing Shed	1	-	1	5.0
Farm Yard or Garden	1	-	1	5.0
Other Place Associated with Agricultural Work	1	-	1	5.0
Total	**10**	**10**	**20**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were working with crops (4: 40.0%) and maintenance activities (3: 30.0%). Nine of the ten (90.0%) bystander fatalities involved persons who were performing recreation activities or playing (Table 2).

Table 2 Activity at time of fatal incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	1	-	1	5.0
Transport for Recreation	1	1	2	10.0
Maintenance	3	-	3	15.0
Hunting	1	-	1	5.0
Working With Crops	4		4	20.0
Recreation or Playing	-	9	9	45.0
Total	**10**	**10**	**20**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to orchard and other fruit farms were tractors (4: 40.0%) and firearms (2: 20.0%). Dams (3: 20.0%) were the most common agent involved in bystander incidents (Table 3).

Table 3 Agent of fatal incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Motorcycle 2 Wheel	1	-	1	5.0
Trailer	-	2	2	10.0
Total Farm Vehicles	**1**	**2**	**3**	**15.0**
Mobile Farm Machinery and Plant				
Tractor	4	2	6	30.0
Slasher	-	1	1	5.0
Total Mobile Farm Machinery and Plant	**4**	**3**	**7**	**35.0**
Workshop Equipment				
Ladder Excluding Ladder Attached to Structure	1	-	1	5.0
Total Workshop Equipment	**1**	**-**	**1**	**5.0**
Other Equipment and Materials				
Gun, Rifle, Shotgun	2	-	2	10.0
Total Other Equipment and Materials	**2**	**-**	**2**	**10.0**
Farm Structures				
House Yard	1	-	1	5.0
Dam	-	3	3	15.0
Irrigation channel	-	2	2	10.0
Total Farm Structures	**1**	**5**	**6**	**30.0**
Working Environment				
Lumber	1	-	1	5.0
Total Working Environment	**1**	**-**	**1**	**5.0**
Total	**10**	**10**	**20**	**100.0**

VEGETABLES INCLUDING POTATOES

Between 1989 and 1992, there were 21 fatalities on Australian vegetable including potato farms. This is an average of five fatalities per year. Of the 21 fatalities on vegetable including potato farms, 18 (85.7%) were of persons working at the time of the incident and three (14.3%) were of bystanders (Table 2.11). Location of Fatal Incident

Paddocks (7: 33.3%), whether under crop or clear for grazing, were the most common locations of fatal incidents related to vegetable including potato farms (Table 4).

Table 4 Location on farm by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	1	5	23.8
Paddock Clear for Grazing	2	-	2	9.5
Stockyards Including Horse Yards	1	-	1	4.8
Roads, Lanes	1	-	1	4.8
Dam, Water Reservoir, Irrigation Channel	1	1	2	9.5
Hay Shed	1	-	1	4.8
Machinery Shed	1	-	1	4.8
Shed, Farm Building NEC	2	1	3	14.3
Farm Excluding Residence NEC	1	-	1	4.8
Farm Yard or Garden	2	-	2	9.5
Other Place Associated with Agricultural Work	1	-	1	4.8
Not Relevant	1	-	1	4.8
Total	**18**	**3**	**21**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were moving goods (4: 22.2%), transport for work purposes (3: 16.7%), maintenance activities (3: 16.7%) and working with crops (3: 16.7%). The three bystanders were involved in recreation or playing (2: 66.7%) and transport for recreation (1: 33.3%) (Table 5).

Table 5 Activity at time of fatal incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	3	-	3	14.3
Transport for Recreation	-	1	1	4.8
Constructing or Installing	2	-	2	9.5
Maintenance	3	-	3	14.3
Earthmoving or Digging	2	-	2	9.5
Working with Animals	1	-	1	4.8
Working with Crops	3	-	3	14.3
Moving Goods	4	-	4	19.0
Recreation or Playing	-	2	2	9.5
Total	**18**	**3**	**21**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to vegetable including potato farms were tractors (4: 22.2%), trucks (2: 11.1%) and powerlines (2: 11.1%) (Table 6).

Table 6 Agent of fatal incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

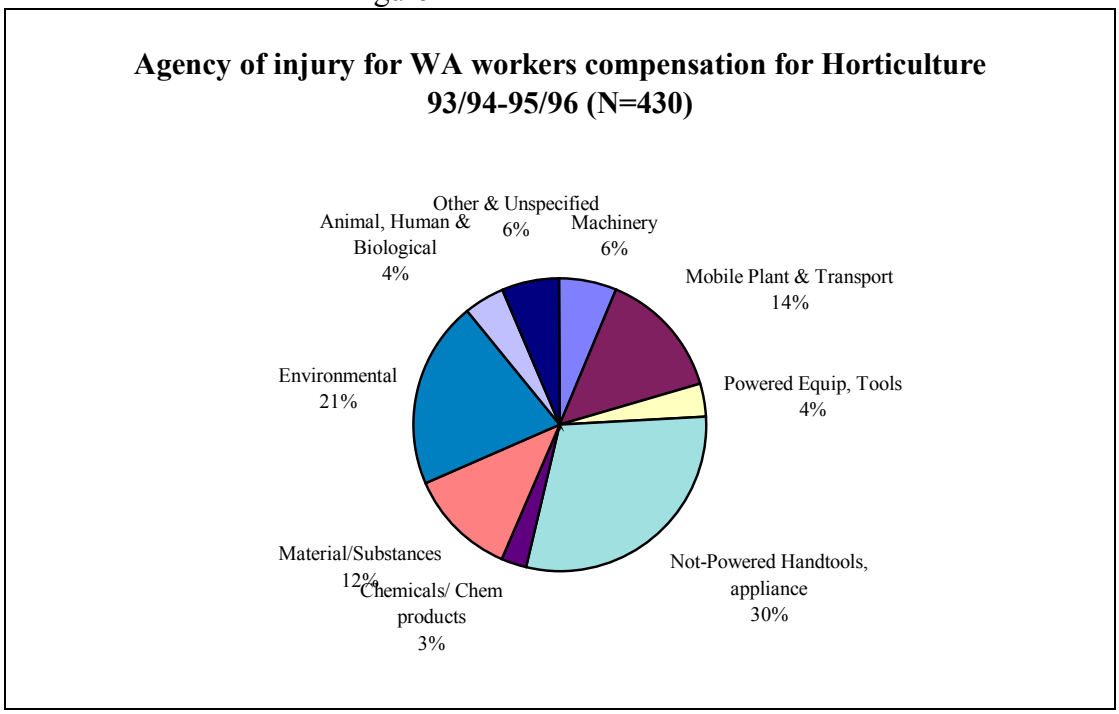
Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	2	-	2	9.5
Car	1	-	1	4.8
Total Farm Vehicles	**3**	**-**	**3**	**14.3**
Mobile Farm Machinery and Plant				
Tractor	4	1	5	23.8
Tillage Seeder	-	1	1	4.8
Posthole Digger	1	-	1	4.8
Other Mobile Farm Machinery and Plant NEC	1	-	1	4.8
Total Mobile Farm Machinery and Plant	**6**	**2**	**8**	**38.1**
Workshop Equipment				
Electric Drill	1	-	1	4.8
Other Workshop Equipment NEC	1	-	1	4.8
Total Workshop Equipment	**2**	**-**	**2**	**9.5**
Other Equipment and Materials				
Forklift	1	-	1	4.8
Total Equipment and Materials				
Farm Structures				
Dam	1	1	2	9.5
Embankment	1	-	1	4.8
Powerlines	2	-	2	9.5
Total Farm Structures	**3**	**1**	**5**	**23.8**
Animals				
Horse	1	-	1	4.8
Snake	1	-	1	4.8
Total Animals	**2**	**-**	**2**	**9.5**
Total	**18**	**3**	**21**	**100.0**

2. WORKERS' COMPENSATION STATISTICS

Western Australia

The following statistics are from workers' compensation information in Western Australia for the financial years 93/94 to 95/96. During this period there were 430 compensation cases. Of these 242 (56%) were from the vegetable growing industry and 188 (44%) were from the fruit growing industry. In the 93/94 financial year there was 91 (21%) cases, for 94/95 there was 170 (40%) and in 95/96 there was 169 (39%) cases.

Figure 1



The most common agent of injury was non-powered handtools, which included harvesting knives, secateurs and other manual harvesting tools. This was followed by environmental conditions (ie climatic conditions, terrain), mobile plant and transport, and material / substances.

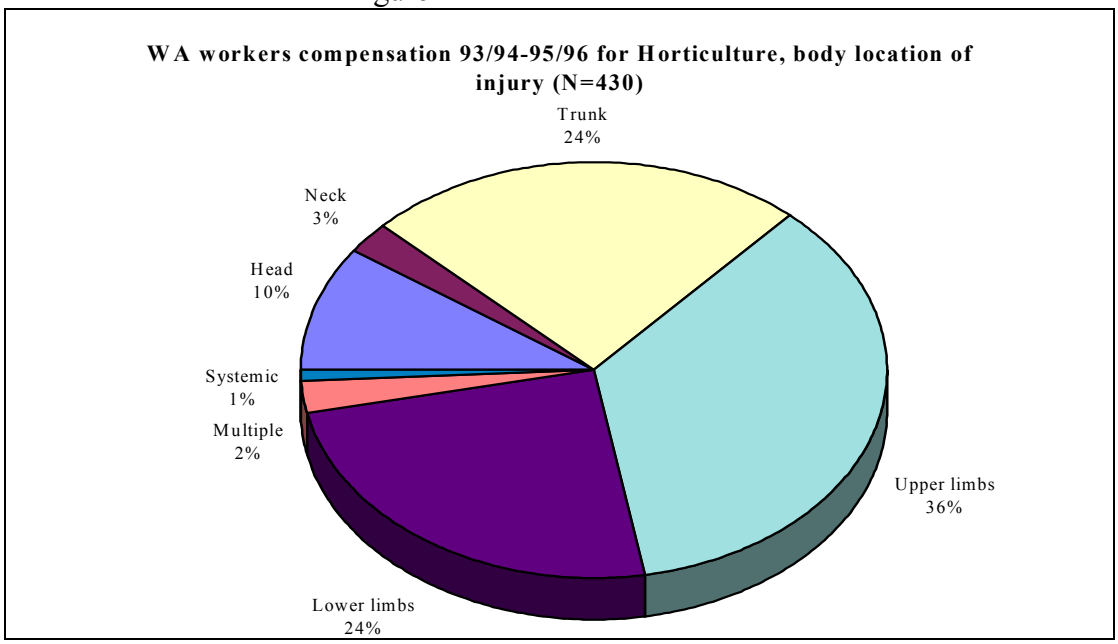
Of the claims 230 (69%) were males and 133 (31%) were female. The percentage of females injured in the horticultural industry is significantly higher than the average for agriculture in general, where female workers represent only 13% of total injuries in all workers' compensation cases in WA.

Table 7 Horticulture workers compensation occupations for 93/94-95/96 (N=430)

Occupation	No.	Percentage
Manager & Administration	51	12%
Tradesperson	12	3%
Plant & Machine Operators & Driver	21	5%
Labourers and related workers	340	79%
Other	6	1%
Total	430	100%

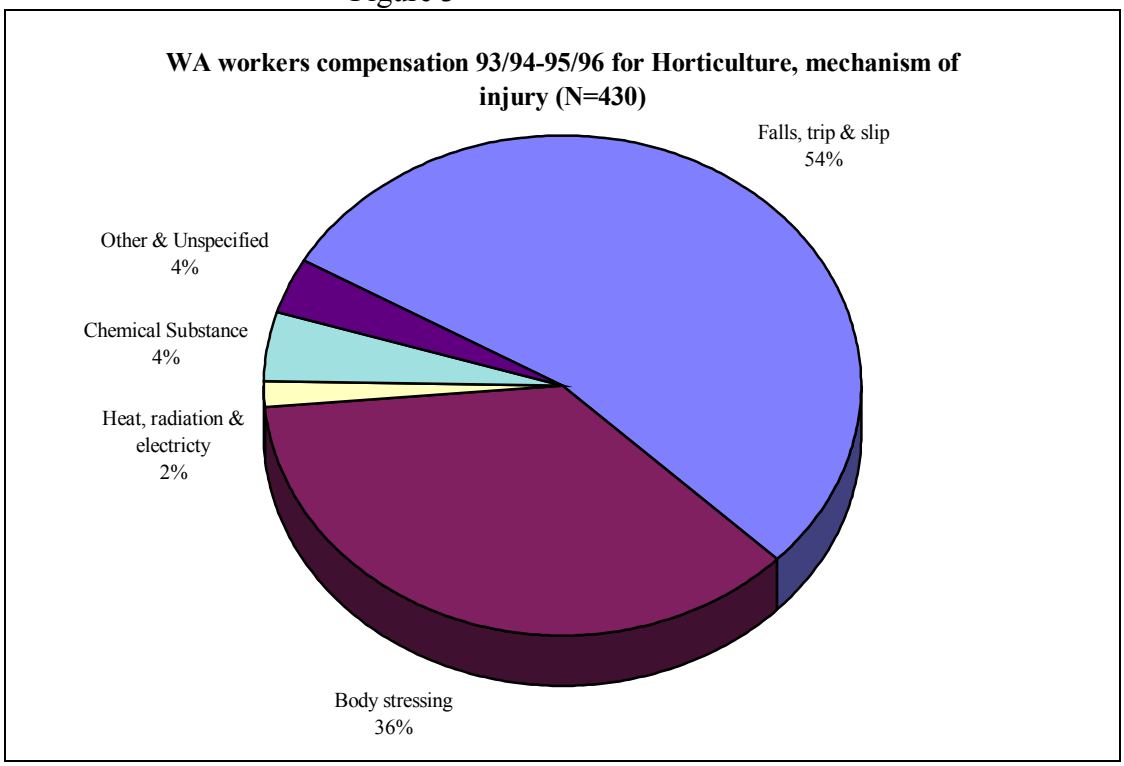
Due to the structure of workers' compensation, where only employed staff are covered, labourers and related workers (79%) make up the majority of claims. This is not to say farm owners are not injured, they are unable to claim compensation through the worker's compensation scheme, thus are not recorded in the statistics. (Table 7)

Figure 2



The body location of injuries (Figure 2) was concentrated around the upper limbs 36%, trunk 24%, and lower limbs 24%.

Figure 3



There were two major mechanism of injury categories for all reported accidents. More than half 231 (54%) were caused by a fall, trip and slip, and 36% of all cases were body stress related.

Figure 4

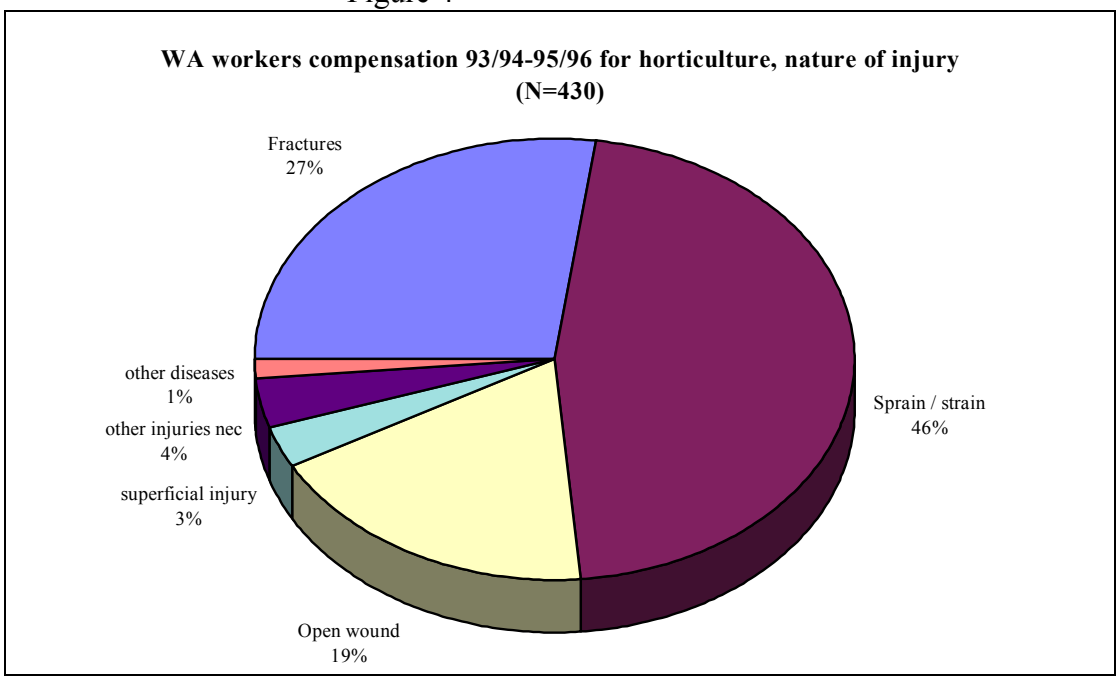


Figure 4 indicates that almost half of all reported injuries are sprains and strains (198), over a quarter are fractures (116) and nearly one third are open wounds (79). Sprains and strains do not tend to be horrific injuries but do require long periods of rehabilitation, particularly back strain, thus increasing the financial cost of the injury.

Table 8. WA workers compensation 93/94-95/96 for horticulture average cost per injury and average days lost per injury.

	Vegetable Growing	Apple & Pear Growing	Stone Fruit Growing	Fruit Growing NEC	Agriculture
Number of claims	242	11	2	175	4759
Average Cost	$8,393	$3,173	$557	$6,135	$7,422
Average Days Lost	36.16	47.73	5.5	21.27	29.04

Table 8 indicates the average cost and average days lost for reported injuries. Due to the very few claims in apple & pear growing and stone fruit growing, it is difficult to obtain a true indication of the those commodity groups. However the table does show the financial cost of injuries can run into many thousand dollars and can take several weeks before the injured worker can return to normal duties.

As shown by the statistics on injury, it is not an uncommon occurrence and can be very costly. This cost is reflected in high premiums for the agricultural industry. Most injuries are not horrific and maiming, but are strains and sprains, which tend to be hidden injuries. Rehabilitation for these injuries can be quite lengthy causing the employer to hire and train

new workers to replace the injured worker, thus increasing the financial stress on farmers. Therefore to reduce this additional, and in most cases unbudgeted cost , farm owners and managers must ensure they control all hazards to worker health and safety.

South Australia

WorkerCover Corporation in 1998 looked briefly into the horticulture industry and produced a summary of the current state of affairs. Following is a summary of the information as provided by Annette Kappler.

The horticulture industry as identified by SA WorkCover Corporation was defined as 'Fruit, Grape & Vegetable growing plus Plant Nurseries'' There were 2855 establishments that fell into their definition and of these 66% of the locations having remuneration of $20,000 or less. Almost half the locations were in the Riverland region, followed by 14% in the Adelaide Hills and the rest evenly distributed across the state.

The five most common types of injury were musculoskeletal 51% of the claims with an average claim cost of $4,200, eye injuries with 13% of the claims and an average claim cost of $100, open wound with 11% of the injuries and an average claim cost of $420, bruise / crush with 9% of the claims and an average claim cost of $2,660 and fractures with 4% of the claims with an average claim cost of $12,000.

Table 9. Most Common Agency of Injuries as identified by Workcover Corporation 1998.

Percentage of Claims	Agency	Average cost of claim
24%	Vegetation	$2,500
13%	Ladders & mobile ramps	$7,500
6%	Agency not apparent	$5,600
4%	Ground surface & traffic	$3,400
3%	Tractors	$2,000
3%	Trailers	$5,000
3%	Secateurs & scissors	$8,400

In table 9 it can be seen that vegetation is the most common agency involved in compensated injuries in SA followed by ladders and mobile rams and agency not apparent. It can also be seen that the highest average cost of claims was for injuries from secateurs & scissors with an average cost of claim of $8,400 although in table 4 the 5 most costly agencies of injuries are displayed.

Table 10. Top 5 most costly agencies of injury from SA Workcover Corporation 1998

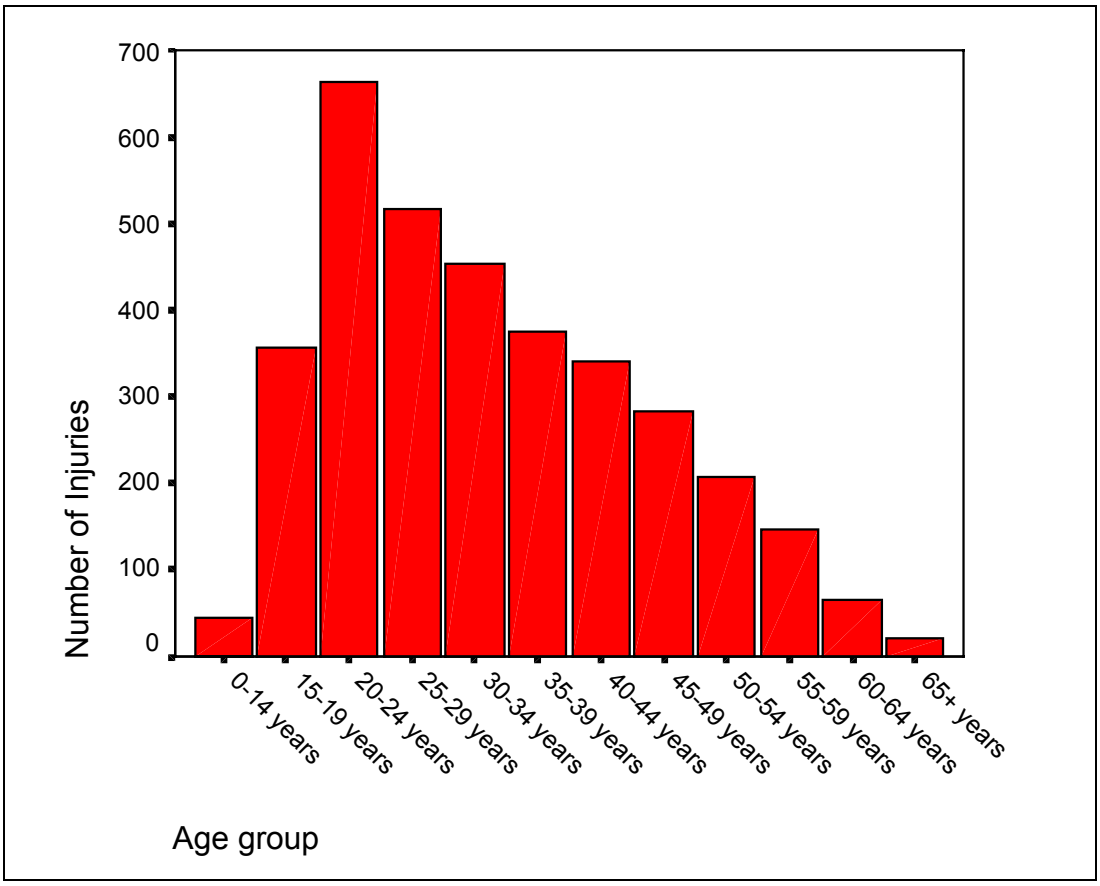
Average cost per claim	Agency
$39,000	Cars
$9,800	Power hoists – falling from
$8,400	Secateurs & scissors
$7,400	Ladders & mobile ramps
$7,000	Chemicals – e.g. lifting 40kg bags, chemicals in eyes, dermatitis

In table 10 the five most costly agencies of injury from SA Workcover Corporation shows that cars followed by power hoists and then secateurs & scissors and the three most expensive. Only secateurs & scissors are in the top seven most common agencies involved in compensatable injuries.

Queensland

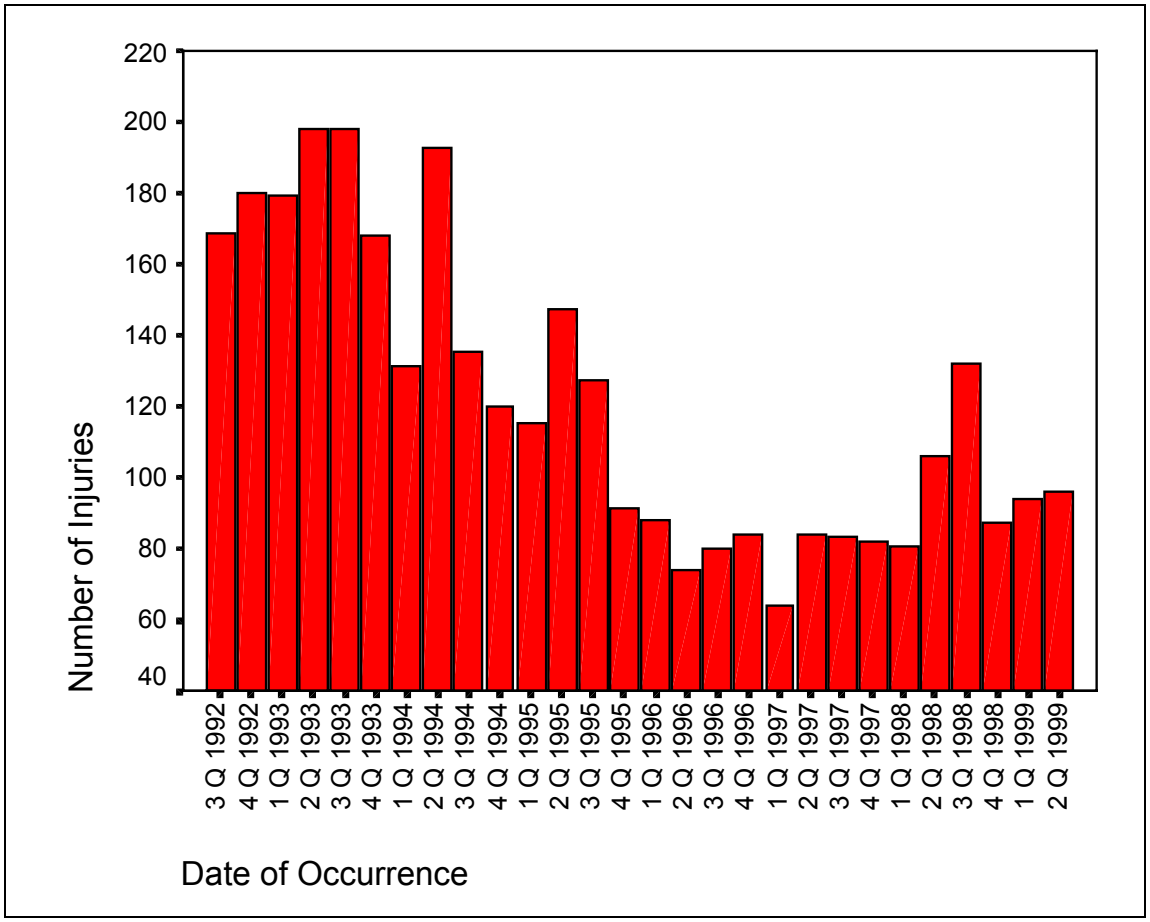
The following is a summary of Queensland horticultural workers' compensation information over a seven-year period from July 1992 till June 1999 for people employed in the following industries; plant nurseries, cut flowers and flower seed, vegetable growing, grape growing, apple and pear growing, stone fruit growing, kiwi fruit growing, and fruit growing NEC. During this period there was 3474 compensated injuries / disease or on average 496 injuries per annum. Of the 3473 compensated injuries over half (58.5%) were aged less than 35 years (Figure 5.)

Figure 5. Age groups of compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999. (N=3474)



There has been a steady decrease in the number of compensated injuries from July 1992 to December 1995 with a flattening out after this period, (Figure 6.). There were 88 injuries where the date of occurrence was unknown or prior to 1 July 1992.

Figure 6. . Date of occurrence of injury by quarters for compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999. (N=3386)



There were 3171 (91.3%) injuries during the period July 1992 to June 1999 and 303 (8.7%) diseases that were compensated. In table 1 the nature of injury / disease is displayed, the most common injuries / disease were *sprains and strains of joints and adjacent muscles* (44.5%), *open wound not involving traumatic amputation* (20.3%) and *fracture* (10.2%).

Table 11. . Nature of Injury / Disease of compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999.

Nature of Injury/Disease	Frequency	Percent
Fractures	353	10.2
Fracture of vertebral column with or without mention of spinal cord lesion	12	.3
Dislocation	35	1.0
Sprains and strains of joints and adjacent muscles	1546	44.5
Intracranial injury, including concussion	7	.2
Internal injury of chest, abdomen and pelvis	2	.1
Traumatic amputation including enucleation of eye (loss of eyeball)	24	.7
Open wound not involving traumatic amputation	705	20.3
Superficial injury	40	1.2
Contusion with intact skin surface and crushing injury	238	6.9
Foreign body on external eye, in ear or nose or in respiratory, digestive or reproductive systems	53	1.5
Burns	67	1.9
Poisoning and toxic effects of substances	42	1.2
Effects of weather, exposure, air pressure and other external causes NEC	3	.1
Multiple injuries	21	.6
Damage to artificial aid(s)	7	.2
Other and unspecified injuries	22	.6
Disorders of nerve roots, plexuses and single nerves	44	1.3
Disorders of the conjunctiva and cornea	2	.1
Deafness	15	.4
Arthropathies and related disorders - disorders of the joint	1	.0
Disorders of muscle, tendons and other soft tissues	71	2.0
Contact dermatitis	1	.0
Other and unspecified dermatitis or eczema	37	1.1
Other diseases of skin and subcutaneous tissue	1	.0
Hernia	51	1.5
Specified zoonoses	29	.8
Viral diseases excluding hepatitis, sexually transmitted diseases and AIDS	11	.3
Other diseases of the respiratory system	1	.0
Ischaemic heart disease	6	.2
Neoplasms of uncertain behavior or unspecified nature	2	.1
Mental disorders	11	.3
Other diseases	14	.4
Total	**3474**	**100.0**

The most common body locations for injuries / disease were *upper limbs* (36.0%), *trunk* (27.3%) and *lower limbs* (24.2%) (Figure 7).

Figure 7. Body location of compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999. (N=3474)

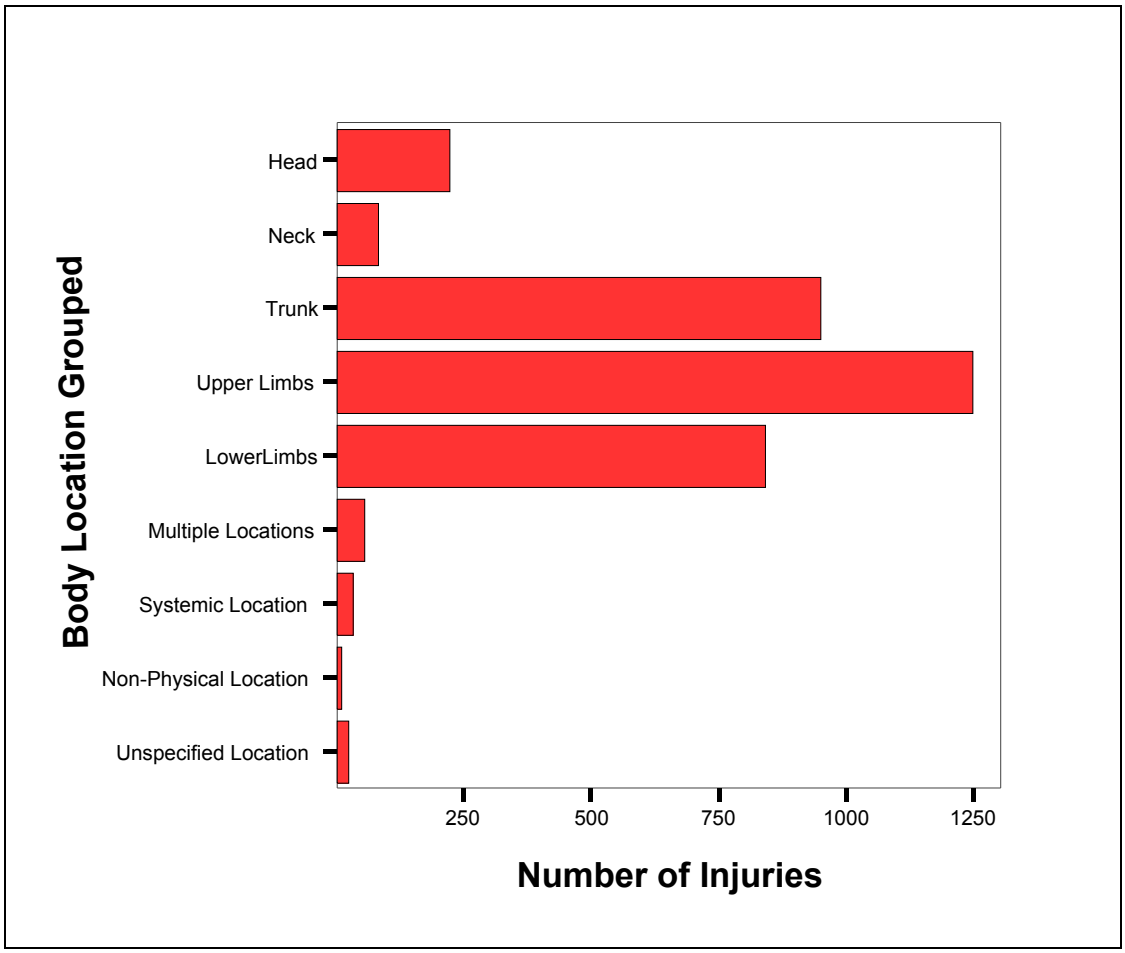


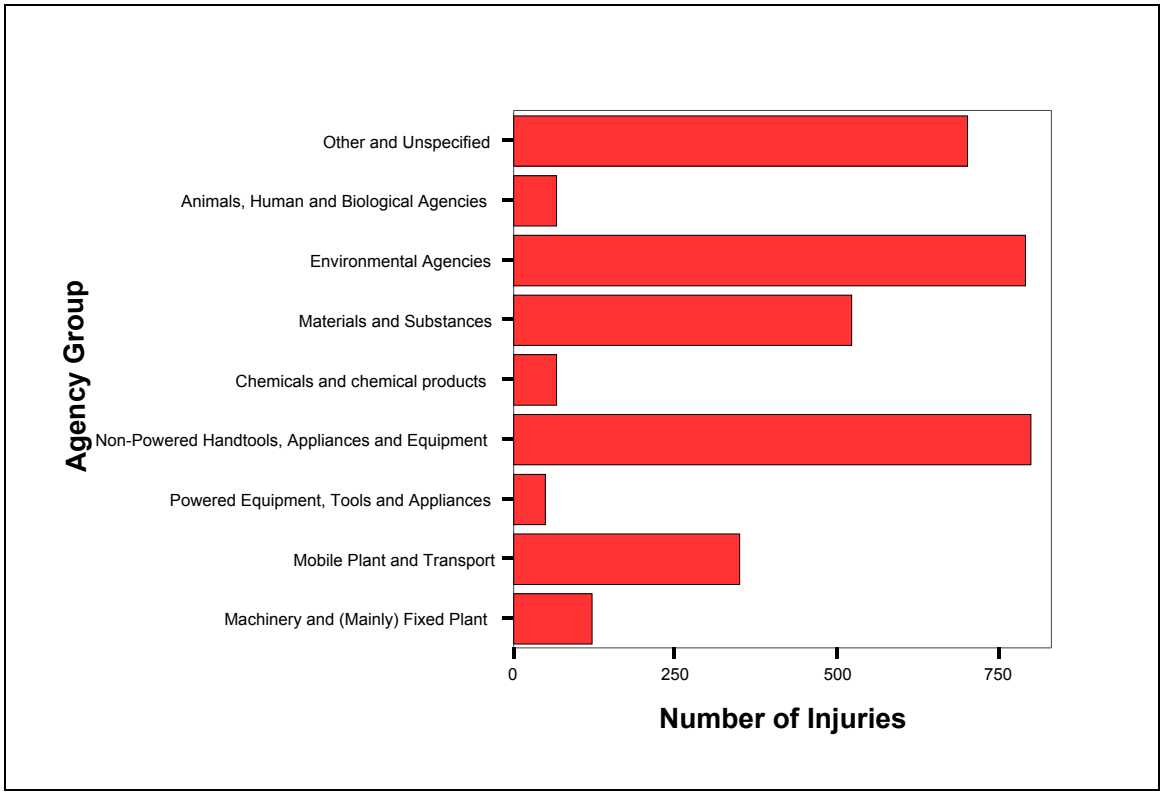
Table 12 displays information about the mechanism of the compensated injury / disease to people employed in the Queensland horticultural industries between July 1992 and June 1999. The three most common mechanisms were; *muscular stress while lifting, carrying, or putting down object* (14.7%), *hitting moving objects* (14.6%) and *muscular stress while handling objects other than lifting, carry, or putting down objects* (13.9%).

Table 12. . Mechanism of compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999.

Mechanism	Frequency	Percent
Muscular stress while lifting, carrying, or putting down object	510	14.7
Hitting moving objects	506	14.6
Muscular stress while handling objects other than lifting, carry, or putting down objects	483	13.9
Falls on the same level	402	11.6
Falls from a height	284	8.2
Unspecified mechanisms of injury	229	6.6
Being hit by moving objects	194	5.6
Vehicle accident	171	4.9
Hitting stationary objects	126	3.6
Muscular stress with no objects being handled	95	2.7
Being hit by falling objects	70	2.0
Other and multiple mechanisms of injury	54	1.6
Being trapped between stationary and moving objects	53	1.5
Being trapped by moving machinery	47	1.4
Single contact with chemical or substance	41	1.2
Long term contact with chemicals or substances	39	1.1
Insect and spider bites and stings	34	1.0
Contact with, or exposure to, biological factors	27	.8
Stepping, kneeling or sitting on objects	24	.7
Contact with hot objects	23	.7
Long term exposure to sounds	15	.4
Repetitive movement, low muscle loading	11	.3
Exposure to mental stress factors	9	.3
Being bitten by an animal	7	.2
Other and unspecified contact with chemical or substance	7	.2
Being hit by an animal	4	.1
Exposure to non-ionising radiation	4	.1
Contact with electricity	3	.1
Being hit by a person	1	.0
Exposure to environmental heat	1	.0
Total	3474	100.0

The most common grouped type of agent was non powered hand tools, appliances and equipment and the three most common agents were *vegetation* (12.5%), *food and beverages* (10.4%) and *knives and cutlery* (6.9%) (Figure 8.).

Figure 8. Grouped agency of Injury / Disease of compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999. (N= 3474)



Of the 3474 compensated injuries / disease to people employed in the Queensland horticultural industries between July 1992 and June 1999, the mean payment was $2,895.40 and the highest payment was $186,710.00 and the total cost of compensated injuries was $10,058,606.00 or $1,436,943.00 per annum (Table 13.).

Table 13. . Total payments of compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999.

Total Payments Grouped	Frequency	Percent
$0-$999	2173	62.6
$1000-$4999	876	25.2
$5000-$9999	188	5.4
$10000-$49999	223	6.4
$50000+	14	.4
Total	**3474**	**100.0**

For the 3474 compensated injuries to people employed in the Queensland horticultural industries between July 1992 and June 1999, there was a total of 88,756 days off work, ranging from zero days to 631 days off. The mean number of days off work for an injury in the Queensland horticultural industries is 25.5 days (Table 14).

Table 4. . Number of days off work for a compensated injuries/diseases to people employed in the Queensland horticultural industries, July 1992 - June 1999.

Total days absent grouped	Frequency	Percent
<1 Day	697	20.1
1-5 Days	868	25.0
6-10 Days	583	16.8
11-20 Days	419	12.1
21-40 Days	400	11.5
41+ Days	507	14.6
Total	**3474**	**100.0**

Scope

Horticulture includes many different agricultural industries from ground crops (including carrots, potatoes and beans) to tree crops (including apples, pears and oranges) and all things in between (such as tomatoes, water melons, blue berries and mushrooms). This profile does not attempt to provide a profile of all horticultural industries; it does however provide a starting place from which to develop specific profiles if required but more importantly specific tools to help address occupational health and safety issues within horticulture.

This profile is a first attempt to examine the risk in horticulture and is by no means comprehensive, over the ensuing years it is envisioned that this profile will be improved and added too. The information is this report has been identified from industry knowledge, workers' compensation information and the publication "National Competency Standards Assessment Guidelines and Qualifications – Horticulture" by the Australian National Training Authority 1998. If you do have specific comments please direct them to:

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Australian Centre for Agricultural Health and Safety
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The profile

The document aims to list the full range of potential hazards to human health and safety on horticultural farms, and to provide information to assist producers, workers and the industry in assessing the degree of risk associated with identified hazards.

The information has taken account of;

- Identified hazards to health and safety in all production phases of horticultural production
- The severity of injury or illness as indicated by risk of death and permanent disability
- The frequency of injury or illness (how often is the worker exposed to the hazard)
- The cost associated with injury and illness
- The requirement to meet relevant occupational health and safety Regulations in relation to controlling physical risks

The information has been derived from;

- Horticultural growers Incident / Accident reports
- Rural Training Council of Australia, National Competency Standards
- Queensland Fruit and Vegetable Grower'
- Horticultural industry information

The **Severity Rating** is derived from consideration of the severity, duration and cost of the most severe injury or illness caused by that hazard. Each identified procedure has a rating ranging from 1 to 5, 5 being extremely severe, eg 2 =

The **Frequency Rating** is a composite rating, taking into account both the typical frequency of exposure of workers and others to the hazard and the frequency of reported injury or illness. As above, is rated 1 to 5, 5 being very frequent exposure, eg 2 =

Specific references used in determining the Frequency Rating

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4. WorkCover Authority NSW, 1992. *Employment Injuries in Agriculture and Forestry, Workers Compensation Statistics NSW 1991/92.*
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8. Australian Agricultural Health Unit. *Pesticide Surveillance Database*.
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14. Division of Workplace Health and Safety, *Tree Fruit Health and Safety Guide*.
15. R.C. Franklin, P. R. Brown, 1998. *Examination of Horticulture Process in Queensland*, December 1997.
16. Western Australian Workers' Compensation Statistics, 1993 - 96
17. Fragar L.J., Gray E.J, Franklin R, Petrauskas V, 1997. *A Picture of Health*, Australian Agricultural Health Unit.
18. Annette Kappler. (1998). Personal Communications.
19. Queensland Workers Compensation Statistics 1992-1999
20. Franklin R, Mitchel R, Driscol T, Fragar L (2000). Farm-related fatalities in Australia 1989-1992. ACAHS, NOHSC & RIRDC Moree

The **Risk Rating** is derived from both of the above ratings, eg. 5 = ☠☠☠☠☠ (extremely hazardous, causing death and/or frequently causing disabling injury)

Hazards and Risks Associated with Horticultural Produce Production

A. GROUND PREPARATION

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
Primary Tillage	Tractor & PTO assembly	Operator, passengers, bystanders	Death/crush injury from rollover, runover Entanglement with PTO Back injury and body strain	■■■■■	■■□□□ **(5, 6,13, 19, 20)**	☠☠☠☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury, back strain	■■■□□	■■■■□ **(6)**	☠☠☠	
	Primary tillage equipment	Operator during operation, interruption and routine maintenance	Death Crush injury, lacerations, contusions	■■■■■	■■□□□ **(1,6,13)**	☠☠☠☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16, 19,20)**	☠☠☠	Fractures more likely in older people
	Flying particles / dust	Operator, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6, 19)**	☠☠	Greater problem for workers with hypersensitivity
	Noise	Operator	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠☠☠☠	
	UV / solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠☠☠☠	Greater risk, middle of the day - children & young adults
Levelling / Bed preparation	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover Back injury and body strain	■■■■■	■□□□□ **(5,6,13,19,20)**	☠☠☠☠	
	Laser plane / field plane	Operator during operation, interruption and routine maintenance	Crush injury, lacerations, contusions	■■■□□	■□□□□ **(6)**	☠☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠☠☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury, back strain	■■■□□	■■■■□ **(6)**	☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
	Towing to site	Operator, bystander	Crush injury from rollover / runover	■■■□□	■□□□□ **(6)**	☠ ☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Dust / particles	Operator, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	Noise	Operator	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠ ☠ ☠ ☠	
	UV / solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
Fertilising	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover Back injury and body strain	■■■■■	■■□□□ **(5,6,13,19,20)**	☠ ☠ ☠ ☠	
	Fertiliser rig	Operator during operation, interruption and routine maintenance	Death Crush injury, lacerations, contusions	■■■■■	■■■□□ **(5,6,13)**	☠ ☠ ☠ ☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury	■■■□□	■■■■□ **(6)**	☠ ☠ ☠	
	Fertiliser handling	Operator	Crush injury to fingers, hands, toes, feet, legs. Back injury, strain / sprain	■■■□□	■■■□□ **(6,8,19)**	☠ ☠ ☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠ ☠ ☠	
	Dust / particles	Operator, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16)**	☠ ☠ ☠	Fractures more likely in older people
	UV / solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
	Fertiliser store / silos / fertiliser bins	Operator	Rhinitis in hypersensitive people Crush injury from falls of unstable structures. Suffocation in silo	■■■■□	■■□□□ **(5,6)**	☠ ☠ ☠ ☠	
	Noise	Operator	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠ ☠ ☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
Herbicide Application	Exposure to herbicides	Operator during mixing, spraying Bystanders during spraying	Acute toxicity, depending on chemical used Unknown long term affects	■■□□□	■■■□□ **(5,6,8)**	☠ ☠ ☠	Subject to Hazardous Substances regulation
	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover Entanglement with PTO Back injury and body strain	■■■■■	■■□□□ **(5,6,13,19,20)**	☠ ☠ ☠ ☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury	■■■□□	■■■■□ **(6)**	☠ ☠ ☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠ ☠ ☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting of chemical containers	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
Infield service & maintenance	Fuel spills	Operator, servicing team	Burns, external, skin conditions	■■■□□	■■■□□ **(5,6,19)**	☠ ☠ ☠	
	Fire	Operator, servicing team	Burns, eye and respiratory effects	■■■□□	■■□□□ **(6,19)**	☠ ☠	
Traffic (workers / maintenance / supervisors)	Utility / Truck - collisions	Driver, passenger(s)	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,16,20)**	☠ ☠ ☠ ☠ ☠	Young or new drivers / workers. Fatigue
	Motorbike - collisions	Rider	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,9,16)**	☠ ☠ ☠ ☠ ☠	“ “
	Roads - loose, damaged road surface	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(2,6)**	☠ ☠ ☠ ☠ ☠	“ “
	Public roads	Road users	Public liability Death, crush injury Back & neck injury	■■■■■	■■■■□ **(6,17)**	☠ ☠ ☠ ☠ ☠	“ “
	Channel crossings	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(6)**	☠ ☠ ☠ ☠ ☠	“ “

B. Plant Propagation

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
Prepare area for planting	Slips / trips / falls	Worker	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting	Worker	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
	Dust / particles	Worker, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	Noise	Worker	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠ ☠ ☠ ☠	
	UV / solar radiation	Worker	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
Preparing propagating material ready for planting	Soils	Worker	Tetanus, Legionnaires Disease,	■■■■□			
	Slips / trips / falls	Worker	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting	Worker	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
	Dust / particles	Worker, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
Planting	Soils	Worker	Tetanus, Legionnaires Disease,	■■■■□			
	Slips / trips / falls	Worker	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting	Worker	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
	Dust / particles	Worker, bystander	Foreign body in eye	■■□□□	■■■■□	☠ ☠	Greater problem for workers with

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
			Respiratory effects		**(6,19)**		for workers with hypersensitivity
	Exposure to pesticides	Worker	Acute toxicity, depending on chemical used Unknown long term affects	■■□□□	■■■□□ **(5,6,8,19)**	☠ ☠ ☠	Subject to Hazardous Substances regulation
Plant support	Slips / trips / falls	Worker	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting	Worker	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
	Dust / particles	Worker, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	Exposure to pesticides	Worker	Acute toxicity, depending on chemical used Unknown long term affects	■■□□□	■■■□□ **(5,6,8,19)**	☠ ☠ ☠	Subject to Hazardous Substances regulation
	Water	Irrigator	Possibility of infection from contaminated water	■■□□□	■■■□□ **(6,20)**	☠ ☠ ☠	
	UV / solar radiation	Worker	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
Preparing Stock For Dispatch	Forklifts	Worker / bystanders	Death/serious injury, crush injuries to body and extremities, factures to feet, ankles, lower limbs, Fume emission (Carbon monoxide poisoning)	■■■■■	■■■□□ **(6)**	☠ ☠ ☠ ☠	
	Slips / trips / falls	Worker	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting	Worker	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
	Dust / particles	Worker, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	UV / solar radiation	Worker	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children &

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
							young adults
Transport of stock	Utility / Truck / forklift - collisions	Driver, passenger(s)	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,16,20)**	☠☠☠☠☠	Young or new drivers / workers. Fatigue
	Roads - loose, damaged road surface	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(2,6)**	☠☠☠☠☠	“ “
	Public roads	Road users	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(6,17)**	☠☠☠☠☠	“ “

C. PLANTING

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
Sowing / Planting	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover Back injury and body strain	■■■■■	■■□□□ **(5,6,13,19,20)**	☠ ☠ ☠ ☠	
	Planter	Operator during operation, interruption and routine maintenance	Crush injury, lacerations, contusions	■■■■■	■■□□□ **(2,5,6)**	☠ ☠ ☠ ☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury	■■■□□	■■■■□ **(6)**	☠ ☠ ☠	
	Bending / Lifting	Worker	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16,19)**	☠ ☠ ☠	
	Seed handling (25kg bags)	Operator	Back injury, strain / sprain	■■■□□	■■■□□ **(6,16,19)**	☠ ☠ ☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠ ☠ ☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Dust / particles	Operator, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	Noise	Operator	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠ ☠ ☠ ☠	
	UV / solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
	Organic dusts / particles	Operator, bystander	Respiratory effects	■■■■□	■■□□□ **(6,19)**	☠ ☠ ☠	Greater risk for workers with hypersensitivity
Pesticide Application	Exposure to pesticides	Operator during mixing, spraying Bystanders during spraying	Acute toxicity, depending on chemical used Unknown long term affects	■■□□□	■■■□□ **(5,6,8,19)**	☠ ☠ ☠	Subject to Hazardous Substances regulation
	Drum disposal / triple rinse / drum crushing	Operator / worker / bystander	Skin contact with pesticides, poisoning, back strain / sprain	■■□□□	■■■□□ **(6,8)**	☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity rating	Frequency rating (Reference)	Risk rating	Associated risk factors
	Tractor, PTO and spray rig assembly	Operator	Death/crush injury from rollover, runover Entanglement with PTO Back injury and body strain	■■■■■	■■□□□ **(5,6,13)**	☠ ☠ ☠ ☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury	■■■□□	■■■■□ **(6)**	☠ ☠ ☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠ ☠ ☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting chemical containers	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16)**	☠ ☠ ☠	
Traffic (workers / maintenance / supervisors)	Utility / Truck - collisions	Driver, passenger(s)	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,16,20)**	☠ ☠ ☠ ☠ ☠	Young or new drivers / workers. Fatigue
	Motorbike - collisions	Rider	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,9,16,20)**	☠ ☠ ☠ ☠ ☠	“ “
	Roads - loose, damaged road surface	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(2,6)**	☠ ☠ ☠ ☠ ☠	“ “
	Public roads	Road users	Public liability Death, crush injury Back & neck injury	■■■■■	■■■■□ **(6,17)**	☠ ☠ ☠ ☠ ☠	“ “
	Channel crossings	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(6)**	☠ ☠ ☠ ☠ ☠	“ “

D. CROP GROWTH

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
Irrigating	Water	Irrigator	Death / Drowning Possibility of infection from contaminated water	■■■■■	■■□□□ **(6,20)**	☠☠☠☠☠	
	Exposure to pesticides	Irrigator	Acute toxicity from contaminated water	■■□□□	■■□□□ **(6,20)**	☠☠	Subject to Hazardous Substances regulation
	Bending / Lifting / moving irrigation pipes	Irrigator	Back injury, musculoskeletal strain / sprain	■■■□□	■■■□□ **(6,16,19)**	☠☠☠	
	Pumping equipment	Irrigator, servicing team	Entanglement with exposed drive shafts, pump impeller, crush injuries from contact with rotating boom.	■■■■■	■■■■□ **(6)**	☠☠☠☠☠	
	Overhead power lines	Irrigator	Electrocution from raising irrigation pipes	■■■■■	■■■□□ **(6,11,16,20)**	☠☠☠☠	
	Shovelling	Irrigator	Manual handling, back strain / sprain Lacerations below the knee	■■■□□	■■■□□ **(6)**	☠☠☠	
	Snake bite	Irrigator	Death, poisoning	■■■■■	■■□□□ **(6)**	☠☠☠☠	
	UV / solar radiation	Irrigator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠☠☠☠	Greater risk, middle of the day - children & young adults
Pesticide Application	Exposure to pesticides	Operator during mixing, spraying Bystanders during spraying	Acute toxicity, depending on chemical used Unknown long term affects	■■■□□	■■■□□ **(5,6,8)**	☠☠☠	Subject to Hazardous Substances regulation
	Tractor, PTO and spray rig assembly	Operator	Death/crush injury from rollover, runover Entanglement with PTO Back injury and body strain	■■■■■	■■□□□ **(5,6,13)**	☠☠☠☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury	■■■□□	■■■■□ **(6)**	☠☠☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠☠☠	Fractures more likely in older people

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
	Bending / lifting chemical containers	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	Level of fitness
Crop inspection	Exposure to pesticides	Manager / supervisor	Acute toxicity from pesticide residues on the plant	■■□□□	■■■□□ **(5,6,8)**	☠ ☠ ☠	
	UV / solar radiation	Irrigator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
	Snake bite	Bug checker	Death, poisoning	■■■■■	■■□□□ **(6)**	☠ ☠ ☠ ☠	
Fertilising	Tractor	Operator, bystanders	Death/crush injury from rollover, runover Back injury and body strain	■■■■■	■■□□□ **(5,6,13,19,20)**	☠ ☠ ☠ ☠	
	Fertiliser spreader	Operator during operation, interruption and routine maintenance	Crush injury, lacerations, contusions Entanglement with PTO Back injury and body strain	■■■■■	■■□□□ **(5,6,13)**	☠ ☠ ☠ ☠	
	Hitching	Operator, assistant	Crush injury to fingers, hands Serious injury	■■■□□	■■■■□ **(6)**	☠ ☠ ☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠ ☠ ☠	
	Dust / particles	Operator, bystander	Foreign body in eye Respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	Greater problem for workers with hypersensitivity
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19,20)**	☠ ☠ ☠	Fractures more likely in older people
	UV / solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,16)**	☠ ☠ ☠ ☠	
	Noise	Operator	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠ ☠ ☠ ☠	
Traffic (workers / maintenance / supervisors)	Utility / Truck - collisions	Driver, passenger(s)	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,16)**	☠ ☠ ☠ ☠ ☠	Young or new drivers Fatigue
	Motorbike / ATV - collisions	Rider	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,9,16)**	☠ ☠ ☠ ☠ ☠	“ “

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
	Roads - loose, damaged road surface	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(2,6)**	☠☠☠☠☠	“ “
	Public roads	Road users	Public liability Death, crush injury Back & neck injury	■■■■■	■■■■□ **(6,17)**	☠☠☠☠☠	“ “
	Channel crossings	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(6)**	☠☠☠☠☠	“ “

E. Harvest / Picking

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
Picking / Harvesting (Mechanical)	Mechanical picker	Operator / bystander	Crush injury, lacerations, contusions, amputation of limbs Death, severe entanglement injury Picker rollover / runover	■■■■■	■■■■□ **(6,12,13,14,15,19, 20)**	☠ ☠ ☠ ☠ ☠	
	Flying particles / Dust	Operator, servicing team	Foreign body in eye, respiratory effects	■■□□□	■■■■□ **(6,19)**	☠ ☠	
	Clearing blockages / routine servicing	Operator during operational interruptions	Crush injury to fingers, hands, arms Lacerations, contusions	■■□□□	■■■□□ **(6)**	☠ ☠ ☠	
	Power lines	Operator	Electrocution, picker and mobile plant coming in contact with power lines	■■■■■	■■■□□ **(6,11,16,20)**	☠ ☠ ☠ ☠ ☠	
Picking / Harvesting (Manual)	Slips, trips and falls from ladders and mobile equipment	Operator, workers	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ **(6,12,13,16,19)**	☠ ☠ ☠	Fractures more likely in older people
	Hand picking	Pickers / workers	Dermatitis, rashes, blisters, eye and respiratory effects	■■■□□	■■■□□ **(6,12,13,14,19)**	☠ ☠ ☠	
	Secateurs / Knives / Cane Knives	Pickers / workers	Cuts and lacerations to fingers, hands, legs and other body regions	■■□□□	■■■■□ **(6,12,13,14,15,19)**	☠ ☠ ☠	
	Bending / lifting	Workers	Back injury, musculoskeletal strain / sprain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
	Noise	Operator, servicing team	Noise induced, high frequency, hearing loss	■■□□□	■■■■■ **(6,7)**	☠ ☠ ☠ ☠	
	UV / solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■ **(5,6,15)**	☠ ☠ ☠ ☠	Greater risk, middle of the day - children & young adults
	Snake and Insect bites	Pickers/workers	Death, Poisoning	■■■■■	■■□□□ **(6)**	☠ ☠ ☠	
	Sap	Workers	Skin Reaction	■■■□□			
Traffic (workers / maintenance / supervisors)	Utility / Truck / Trailer - collisions	Driver, passenger(s), field crew	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,16,20)**	☠ ☠ ☠ ☠ ☠	Young or new drivers / workers. Fatigue

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
	Motorbike - collisions	Rider	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,9,16)**	☠ ☠ ☠ ☠ ☠	“ “
	Roads - loose, damaged road surface	Driver / rider / passenger		■■■■■	■■■■□ **(2,6)**	☠ ☠ ☠ ☠ ☠	
	Public roads	Road users	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(6,17)**	☠ ☠ ☠ ☠ ☠	
	Channel crossings	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(6)**	☠ ☠ ☠ ☠ ☠	“ “

F. MACHINERY, EQUIPMENT, AND STORAGE MAINTENANCE

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
Traffic (workers / maintenance / supervisors)	Utility / Truck - collisions	Driver, passenger(s)	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,16,20)**	☠ ☠ ☠ ☠ ☠	Young or new drivers / workers. Fatigue
	Motorbike - collisions	Rider	Death, crush injury Back & neck injury	■■■■■	■■■■□ **(2,6,9,16)**	☠ ☠ ☠ ☠ ☠	"
	Roads - loose, damaged road surface	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(2,6)**	☠ ☠ ☠ ☠ ☠	"
	Public roads	Road users	Public liability Death, crush injury Back & neck injury	■■■■■	■■■■□ **(6,17)**	☠ ☠ ☠ ☠ ☠	"
	Channel crossings	Driver / rider / passenger	Death, crush injury / drown Back & neck injury	■■■■■	■■■■□ **(6)**	☠ ☠ ☠ ☠ ☠	"
Pesticide storage	Exposure to pesticide	Farm community / workers	Acute toxicity, depending on chemical stored Unknown long term affects	■■□□□	■■■□□ **(5,6,8,19)**	☠ ☠ ☠	Subject to Hazardous Substances regulation
	Solvents	Farm community	Skin conditions Toxicity	■■□□□	■■■□□ **(5.6.15)**	☠ ☠ ☠	
	Slips, trips, falls	Workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■□□□	■■■■□ **(6,12,13,16,19)**	☠ ☠ ☠	Fractures more likely in older people
	Bending / lift chemical drums	Workers	Back injury, strain	■■■□□	■■□□□ **(6,16,19)**	☠ ☠ ☠	
General Storage	Paint solvents / cleaning agents	Workers	Skin conditions Toxicity	■■□□□	■■■□□ **(5,6,15,19)**	☠ ☠ ☠	
	Bending / lifting	Workers	Back injury, strain	■■■□□	■■■■□ **(6,16,19)**	☠ ☠ ☠	
	Slips, trips, falls	Workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■■□□	■■■■□ **(6,12,13,16,19)**	☠ ☠ ☠	Fractures more likely in older people
Use of Power Tools	Electricity	Worker, assistant	Death, electrocution	■■■□□	■■■■□ **(2,6,20)**	☠ ☠ ☠ ☠ ☠	
	Steel fragments from grinders	Worker, assistant	Steel fragments in eye	■■■□□	■■■■■	☠ ☠ ☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
	and drills		Minor skin burns		(2,6,11,12,13,19)		
	Saws - bench, portable	Worker	Lacerations, contusions	■■■□□	■■■■■ (2,6,11,12,13,19)	☠ ☠ ☠	
	Grinders	Worker	Laceration, contusions, burns	■■■□□	■■■■■ (2,6,11,12,13,19)	☠ ☠ ☠	
	Air compressor (compressed air)	Workers, bystanders	Penetrating injury, particles into eye, entanglement with belt drive	■■■□□	■■■□□ (6,13,19)	☠ ☠ ☠	
	Noise	Worker, assistant, bystanders	Noise induced hearing loss	■■□□□	■■■■■ (6,7)	☠ ☠ ☠ ☠	
Us of Hand tools	Contact with hands and fingers	Worker	Crush injury hands, fingers	■■■□□	■■■■■ (2,6,16,19)	☠ ☠ ☠	
Use of Hoist	Failure - due to poor maintenance / lifting incorrect weights	Worker, assistant, bystander	Crush injury, death	■■■■■	■■■□□ (6,19,20)	☠ ☠ ☠ ☠ ☠	
Welding	Oxyacetylene explosion	Worker, bystanders	Burns, penetrating injury	■■■■■	■■□□□ (6)	☠ ☠ ☠ ☠	
	Welding arc	Worker, bystanders	Flash burns to eyes and skin	■■■□□	■■■■□ (2,5,6,13,19)	☠ ☠ ☠ ☠	
	Welding fumes	Worker, bystanders	Respiratory toxicity	■■□□□	■■■□□ (2,5,6,13)	☠ ☠	
Tyre repairs	Explosion	Worker, bystanders	Penetrating injury	■■■■■	■■□□□ (6,20)	☠ ☠ ☠ ☠	
	Falling tyres	Worker, bystander	Crush injury, sprains / strains Multiply limb fractures	■■■■□	■■□□□ (6)	☠ ☠ ☠	
General hazards	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrists	■■□□□	■■■■□ (6,12,13,16,19)	☠ ☠ ☠	Fractures more likely in older people
	Bending / lifting, bench areas	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	■■□□□ (6,16,19)	☠ ☠ ☠	
	Noise	Worker, assistant, bystanders	Noise induced hearing loss	■■□□□	■■■■■ (6,7)	☠ ☠ ☠ ☠	
	Solvents / petroleum products	Worker / handler	Skin conditions Toxicity	■■□□□	■■■□□ (5,6,13)	☠ ☠ ☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
	Fuel tank explosions / fires	All workshop employees	Death Burns to the body and eyes Eye and respiratory effects	■■■■■	■■□□□ **(6)**	☠ ☠ ☠ ☠	
	Fires, combustible materials	All workshop employees	Burns to the body and eyes Eye and respiratory effects	■■■□□	■■■□□ **(6,19)**	☠ ☠ ☠	
Ground Maintenance							

G. PACKING SHED

Production phase	Associated physical hazards	Who's at risk	Nature of Risk	Severity Rating	Frequency Rating (reference)	Risk Rating	Associated risk factors
Unload harvested produce	Tractor / Haulage vehicle / tipping unit.	Operators, shed workers, bystanders	Death/serious injury, crush injuries to body and extremities, factures to feet, ankles, lower limbs	■■■■■	■■□□□ **(5,6,13,19,20)**	☠☠☠☠	
	Bending / lifting	Shed workers	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16,19)**	☠☠☠	
	Slips, trips and falls	Shed workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■■□□	■■■■□ **(6,12,13,16,19)**	☠☠☠	
	Sap	Shed Workers	Skin reaction	■■■□□			
Chemical wash down	Chemical poisoning	Shed workers	Acute toxicity, depending on chemical used.	■■□□□	■■□□□ **(6,13,19)**	☠☠	
	Slips, trips and falls	Shed workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■□□□	■■■■□ **(6,12,13,16,19)**	☠☠☠	
	Noise	Shed workers	Noise induced hearing loss	■■□□□	■■■■■ **(6,7)**	☠☠☠☠	
Conveyor sorting / packing line	Belt and conveyor rollers	Shed worker	Crush / pinch injury to fingers and hands. Fractures, lacerations and bruising.	■■■□□	■■■□□ **(6,13)**	☠☠☠	
	Bending / Lifting / Reaching	Shed workers	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16,19)**	☠☠☠	
	Slips, trips and falls	Shed workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■□□□	■■■■□ **(6,12,13,16,19)**	☠☠☠	
	Noise	Shed workers	Noise induced hearing loss	■■□□□	■■■■■ **(6,7)**	☠☠☠☠	
Packaging	Belt and conveyor rollers	Shed worker	Crush / pinch injury to fingers and hands. Fractures, lacerations and bruising.	■■■□□	■■■□□ **(6,13)**	☠☠☠	
	Bending / Lifting	Shed workers	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16,19)**	☠☠☠	
	Slips, trips and falls	Shed workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■□□□	■■■■□ **(6,12,13,16,19)**	☠☠☠	
	Noise	Shed workers	Noise induced hearing loss	■■□□□	■■■■■ **(6,7)**	☠☠☠☠	
Palletising	Forklifts	Shed worker / bystanders	Death/serious injury, crush injuries to body and extremities, factures to feet,	■■■■■	■■■□□ **(6)**	☠☠☠☠	

Production phase	Associated physical hazards	Who's at risk	Nature of Risk	Severity Rating	Frequency Rating (reference)	Risk Rating	Associated risk factors
			ankles, lower limbs, Fume emission (Carbon monoxide poisoning)				
	Bending / Lifting	Shed workers	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16,19)**	☠☠☠	
	Noise	Shed worker / bystanders	Noise induced hearing loss	■■□□□	■■■■■ **(6,7)**	☠☠☠☠	
	Slips, trips and falls	Shed workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■□□□	■■■■□ **(6,12,13,16,19)**	☠☠☠	
Cold storage	Forklifts	Shed worker / bystanders	Death/serious injury, crush injuries to body and extremities, factures to feet, ankles, lower limbs	■■■■■	■■■□□ **(6,20)**	☠☠☠☠	
	Fume emission	Shed worker / bystander	Carbon monoxide poisoning	■■■□□	■■□□□ **(6)**	☠☠	
	Bending / Lifting	Shed workers	Back injury, musculoskeletal strain/sprain	■■■□□	■■■□□ **(6,16,19)**	☠☠☠	
	Slips, trips and falls	Shed workers	Back injury, sprains, strains, fractures of ankles, wrists, feet	■■□□□	■■■■□ **(6,12,13,16,19)**	☠☠☠	
	Hypothermia ?	Shed workers	Death / ?	■■■■■	■□□□□ **(6)**	☠☠☠	