HEALTH AND SAFETY IN THE AUSTRALIAN COTTON INDUSTRY

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1. INTRODUCTION

At the Cotton Conference in 1990, I presented a paper which outlined the broad health and safety issues for the cotton industry in Australia. Health effects for the workforce included traumatic injury, noise induced hearing loss, chemical exposure, respiratory effects of cotton dust and climatic effects.

Since that time, the Agricultural Health Unit has been involved in monitoring and research programs involving the cotton industry in the Gwydir and Namoi Valleys and a health and safety profile is being developed with the industry. Cotton industry worker risks are associated primarily with injury and pesticide exposure, although respiratory disease associated with cotton dust requires further research effort.

2. INJURY ON COTTON FARMS

Patients who present with injury to Accident and Emergency Departments of the 6 hospitals of Moree, Narrabri, Wee Waa, Boggabri, Warialda and Bingara in North West NSW have been requested to participate in an injury surveillance program since November 1990. 32.5 percent of all cases of injury presenting to the Accident and Emergency services participated in the survey in the first year of surveillance. Analysis of data regarding injury occurring on cotton farms for the first year of surveillance was undertaken and has been considered by a Cotton Farm Safety Group which has been meeting to plan programs to improve health and safety in the industry.

As the hospital database was small at this stage, the Cotton Farm Safety Group obtained data on cotton farm injury held by a small number of larger companies, and these have been used by the group to identify priority problems.

2.1 There were 57 cases of cotton farm injury reported through the A&E departments during one year. It is estimated that this represents an annual injury presentation rate of 65 per 100 cotton farms, (87 per 100 cotton farms in the Moree Plains Shire). No data are available to estimate risk per worker per annum).

137 injury cases were reported in company data, covering a period of more than 1 year.

2.2 The A&E survey **age/sex distribution** of injured on cotton farms is demonstrated in Figure 1 and indicates that males aged 20-29 are most frequently injured (40.4%), this pattern is reflected by the company data, where males in this age group comprise 40.1 percent of the injured

2.3 Injuries occur on each **day of the week** , although Sunday has the lowest frequency of injury.

2.4 The **context** within which injury occurs on cotton farms is demonstrated in Figure 2. Of significance is the high proportion of injury occurring during the activity of farm machinery and equipment maintenance (35.1%). This is not inconsistent with findings relating to all farm injury occurring the North West Plains of NSW, where 23 percent of injuries on farms are associated with farm machinery and equipment maintenance activities.

2.5 The common **agents of injury** are demonstrated in Figure 3 for the A&E department survey, and in Figure 4 for the Company data.

Both data sets indicate the importance of workshop equipment (grinders, welders) of farm vehicles, and of tractors and heavy machinery. Irrigation equipment and pumps are important in the Company data set.

2.6 The **nature of injury and body part injured** differ significantly between the 2 data sets,. Both indicate the importance of eye and hand injury, which are commonly affected in farm maintenance injury. However, the company data set, not being derived from injuries presenting to A&E Departments include a greater number of injury to the trunk (mainly back) and of strain/sprain injury.(Figures 5 &6)

Further work is being undertaken to obtain more data both from cotton farms directly, and from the hospital system. However, the following should be considered as **priorities for injury prevention programs**:

1. Farm equipment maintenance injury
2. Injury caused by vehicles on cotton farms
3. Back strain and manual handling

The Cotton Farm Safety Group has agreed that a major campaign should be mounted to improve cotton farm workshop safety, in association with the North West Farmsafe "Safer Work in the Farm Workshop" program.

3. PESTICIDE EXPOSURE

Cholinesterase screening tests for exposure to organophosphate and carbamate insecticides have been available through the NSW Workcover Authority on an annual basis, and through the local laboratory of the Moree District Hospital for 2 years. Cotton chippers rarely utilised the service so that before February of 1992, there was no information to suggest that cotton chippers were at risk of pesticide exposure in the course of their work. However, in February of last year a small number of chippers showed lower than normal levels of cholinesterase.

A CRDC funded study into pesticides exposure of cotton chippers in the Gwydir Valley was undertaken by the Agricultural Health Unit, under the technical direction of Dr Tim Churches. The 1991/92 season survey involved two components:

3.1 Cotton Chipper Survey

3.1.1 During the 1991/92 season cotton chippers were surveyed regarding their chipping activity, type of clothing being worn, and health status. They had venous blood taken for blood cholinesterase testing. Repeat surveillance and blood testing was repeated on a fortnightly basis throughout the cotton chipping season.

410 cotton chippers were included in the study, 110 of whom were surveyed on more than one occasion.

3.1.2 Data are still being analysed. However, early analysis demonstrates that there was significant variation in red blood cell (RBC) cholinesterase in individual cotton chippers during the course of the chipping season.

Expected individual variation in RBC cholinesterase in unexposed persons is less than 10 per cent. Known causes of variation are organophosphate and carbamate chemical exposure (resulting in depression of levels) and reticulocytosis, which is the body's replacement of RBC (resulting in recovery of, or increase in levels).

Variation above 20 per cent in an individual chipper will thus be interpreted as demonstrating measurable levels of exposure of cotton chippers to organophosphate and/or carbamate insecticides.

3.2 Pesticide Recovery Study

.2.1 In order to determine which body parts may be being exposed to pesticides during the course of cotton chipping work, chemical assays were performed on sections of test clothing worn by volunteer chippers working for 2 hours in fields known to have been sprayed with endosulfan (at 2 different reentry periods) and profenofos (once). Test clothing included cotton trousers, shirt and overboots, cotton gloves and cap and a mask with disposable cartridge was worn during the 2 hours. Sections of clothing from the foot, ankle, shin, thigh, chest, back, forearm, glove and cap and the respiratory cartridges were assayed.

The body parts which appear to have been exposed to higher pesticide deposition on a "per cm2" basis are legs, thighs, hands, forearms and feet. However, results are being considered on the basis of area of body surface and relative absorption rates of differing body parts to determine which body areas may be associated with greatest absorption of pesticides.

3.3 Preventive Action

3.3.1 Pending the outcome of the study, consideration is being given to determining an effective way to reduce risk of exposure of cotton chippers to pesticides.

Theoretically there are a number of ways that exposure may be reduced:

1. Prevention of entry of persons to fields until there is adequate degradation of pesticide residues.
2. Modifying chipping work practices in relation, for example, to entering wet fields and to washing facilities.
3. Appropriate clothing.
4. Alternative chipping systems separating chippers from plants.
5. Reduction of dependence on human weed removal.

The Australian Cotton Foundation, with the Commonwealth Employment Service has already promulgated recommendations regarding health and safety for cotton chippers in readily available leaflet. Currently these recommendations are seen as the essential basis for improving health and safety for chippers.

3.4 Other Issues

Cotton chippers may also be exposed to accidental contamination by pesticides. A gang of chippers experienced endosulfan toxicity following an accidental contamination by aerial spray during the research program. Access to emergency wash-down facilities and change of clothing was not available. Recommendations relating to improved wash facilities and to improved communication between aerial operators and chipping crews are being made.

4. FUTURE DIRECTIONS

Further work is required to confirm the results of studies into cotton farm injury, to monitor the effects of injury prevention programs, and to identify other causes of injury in the industry.

Similarly, ongoing research is necessary to further define the nature and scale of risk of pesticide exposure to cotton chippers, to develop clear guidelines for reduction of exposure and to monitor the effectiveness of preventive action.

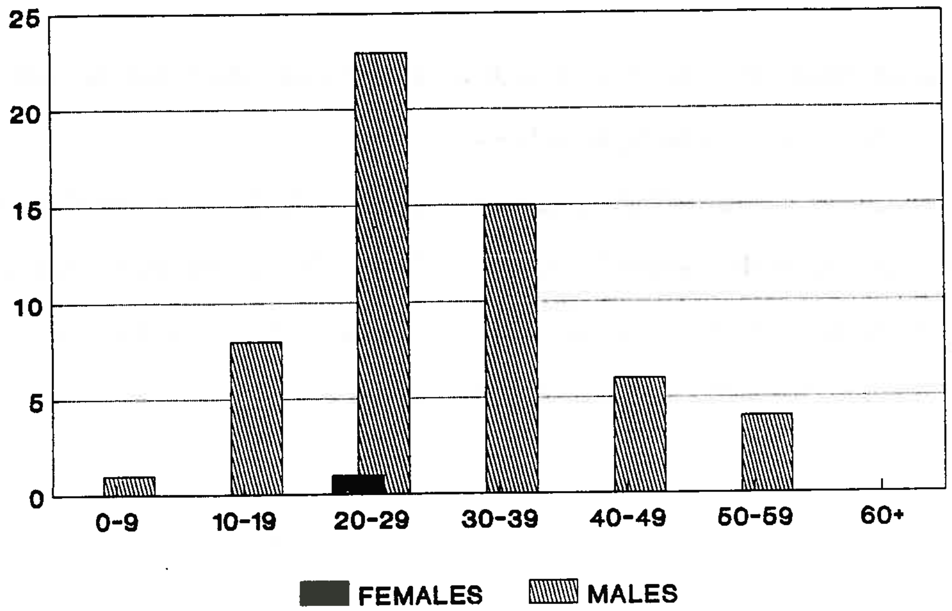
Attention to determine the nature and scale of pesticide exposure risk to other workers who work in sprayed cotton fields is also required.

Respiratory disease associated with cotton dusts needs to be further investigated. Asthma associated with cotton dust is an identified problem for some workers and, some preliminary monitoring of lung function has been undertaken in cotton gins.

While these specific programs of research are important to the industry, attention is also required to ensure that medical and health services in cotton growing areas are adequate to ensure accurate and prompt diagnosis and treatment. A program has been initiated to assist rural doctors in cotton growing areas in the diagnosis of pesticide associated illness with the development of a handbook which will be updated and reviewed to ensure its ongoing usefulness.

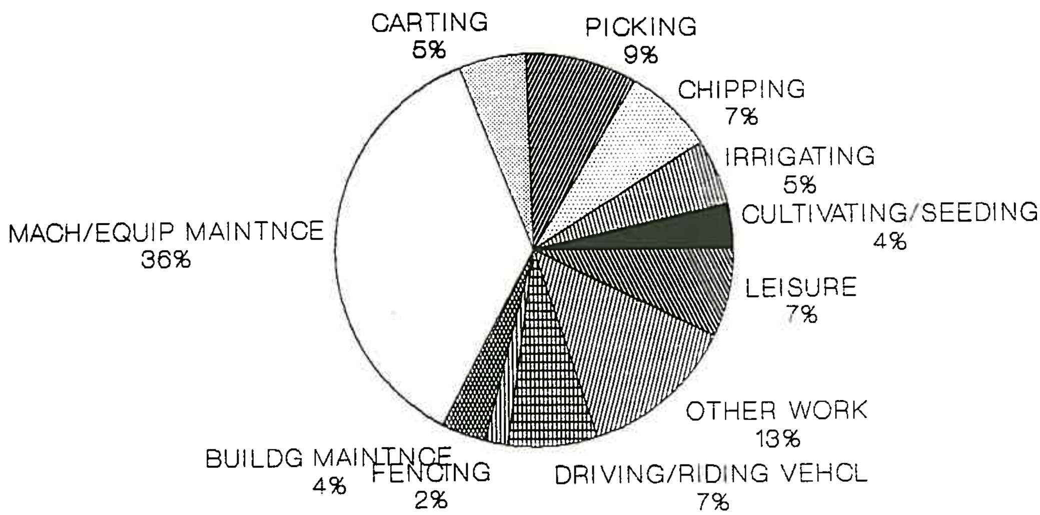
The Agricultural Health Unit remains interested in further collaboration with the cotton industry, as the industry's attention to human health and safety issues, and its willingness on an industry basis to identify and address problems in this area is being seen as a model for other agricultural industries.

FIGURE 1. NW PLAINS COTTON FARM INJURY
AGE SEX DISTRIBUTION



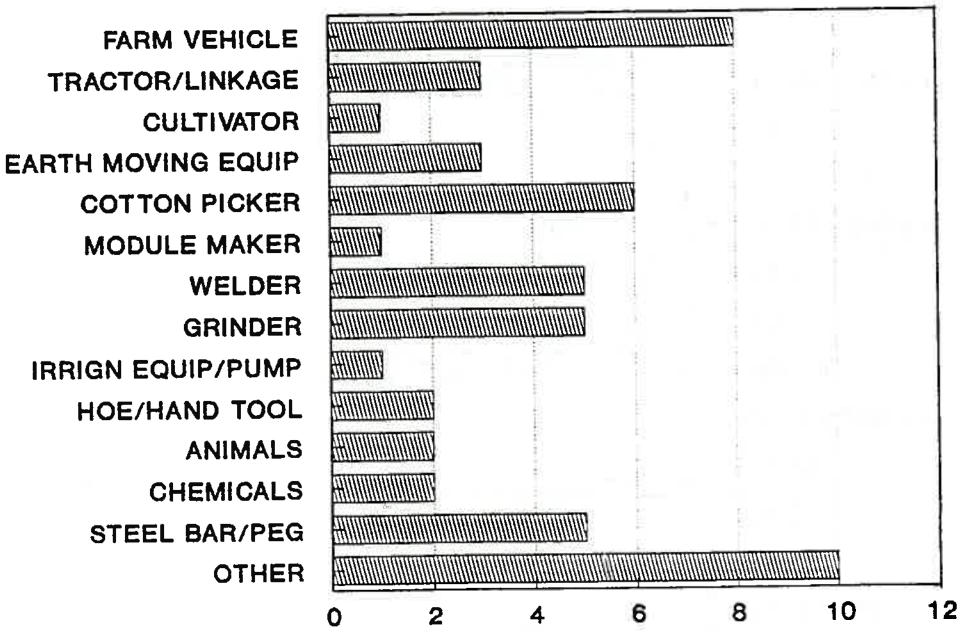
Source: RIPP Data Nov 1990 - Oct 1991

FIGURE 2. NW PLAINS COTTON FARM INJURY
AGRICULTURAL CONTEXT OF INJURY



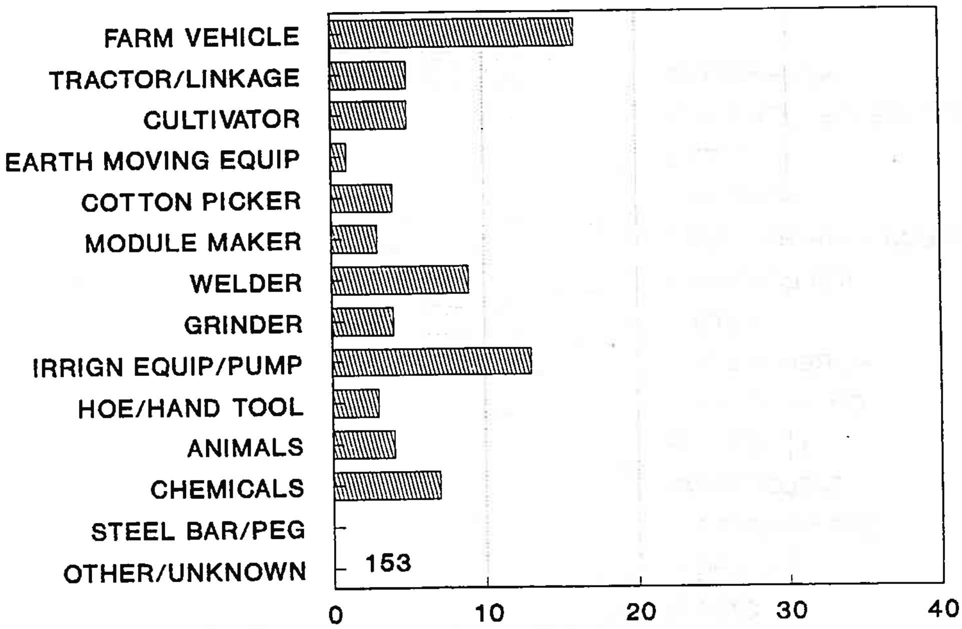
Source: RIPP Data Nov 1990 - Oct 1991

FIGURE 3. NW COTTON FARM INJURY
AGENT OF INJURY



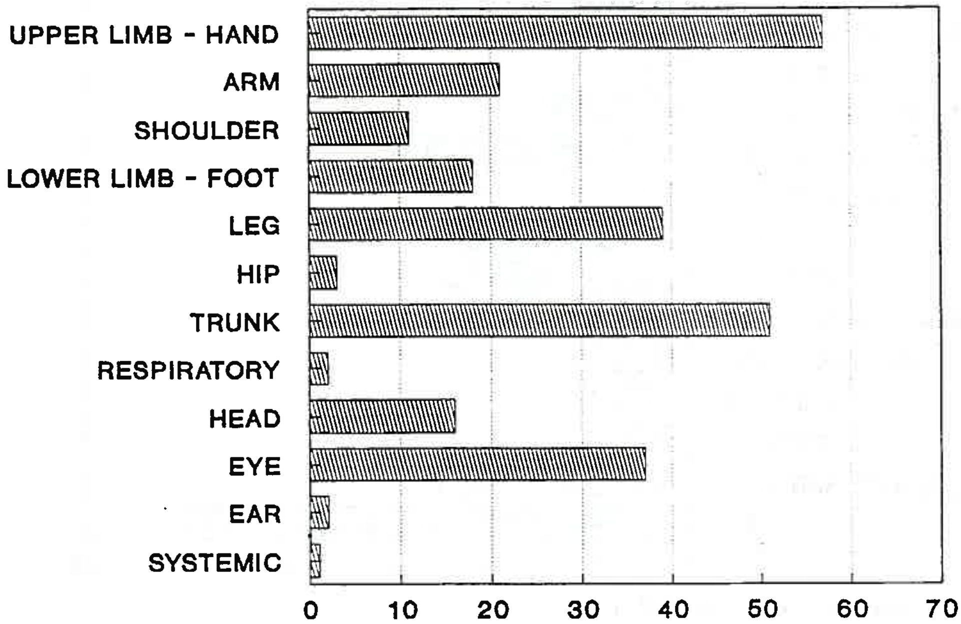
Source: RIPP Data Nov 1990 - Oct 1991

FIGURE 4. NW COTTON FARM INJURY
AGENT OF INJURY - COMPANY DATA



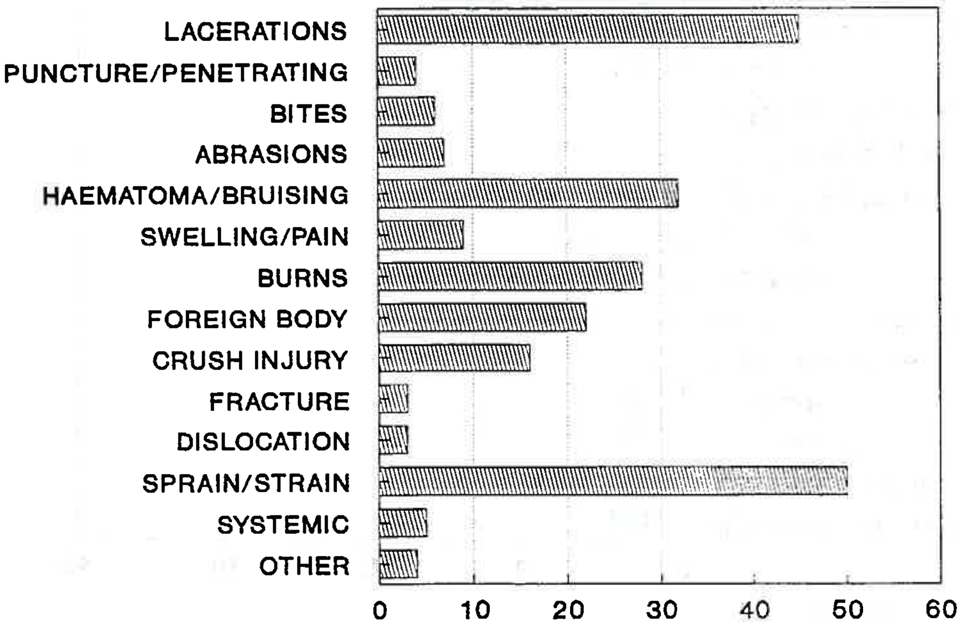
Source: Company Data

FIGURE 5. NW COTTON FARM INJURY
BODY PART INJURED - COMPANY DATA



Source: Company Data

FIGURE 6. NW COTTON FARM INJURY
NATURE OF INJURY - COMPANY DATA



Source: Company Data