

Survey Analysis of the Farm Machinery Accidents

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Abstract: A review of accidents involving farm machinery, which occurred in Korea during 2002, shows that 90.7% of farm-work accidents and 9.3% of traffic accidents were linked to agricultural machinery. The frequency of accidents per annum amounts to 72.2 out of 10,000 vehicles, 94.4% of which relates to tillers and tractors. An analysis of the causes of the accidents revealed that 49.1% of farm-work accidents were due to the tiller driver's fault or error. In the case of traffic accidents, 83% of farm machinery mishaps were found to be due to violation of traffic regulations while 60.4% of the farm machinery damage resulted from faulty driving or lack of safe driving practices. The average casualty count of farm machinery-related accidents is 1.39 persons per case, which consist of 0.07 deaths, 0.74 serious injuries, and 0.58 slight injuries.

Keywords: Agricultural Machinery, Accidents at Work, Farm-Work Accidents, Traffic Accidents

Introduction

Since the 1970s, the mechanization of Korean farming has rapidly developed due to the shortage of agricultural labor and the swift increase in wages.

As farm machinery usage became more widespread, accidents at work also increased in frequency. Consequently, effective countermeasures had to be formulated and implemented.

In order to prevent accidents related to farm machinery, researches into the realities of accidents have been conducted every five years since 1982. On the other hand, it is worth noting that farmer training, farm machinery test and appraisal, and government support, have been consistently promoted to ensure the safe use of farm machinery, based on analyses conducted on the causes of the accidents.

This study was conducted to acquire the basic data required to bring to light the realities of farm machinery-related accidents taking place at work and to provide precautionary measures for proper prevention.

Methods of Survey

A comprehensive survey was carried out across 9 cities and counties in the provinces (Table 1) of Kyonggi, Chonnam, and Kyungbuk. For farm work-related accidents, 24 Eup-Myuns and 70 villages were taken as subjects. In the case of farm-machinery-related traffic accidents, the police station

Table 1 List of investigated regions

Provinces	Counties		
	Plain area	Medium area	Mountainous area
Kyonggi	Ichon	Yongin	Yangpyung
Chonnam	Haenam	Kangjin	Jangheung
Kyungbuk	Kumi	Kimchon	Munhyong

of each city and county in the region was surveyed. The survey was taken during the period from April to October in 2003. The main subject of the survey involved the farm machinery-related accidents that broke out in 2002.

Results and Discussion

1. Types and Distribution of Farm Machinery Accidents

Farm machinery accidents are classified into farm-work accidents and traffic accidents. The frequency of accidents related to farm machinery is 72.2 per 10,000 vehicles per annum, 90.7% of which is accounted for by farm-work accidents and 9.3% by traffic accidents (Table 2). Meanwhile, the frequency of accidents classified according to the types of farm machinery involves 129.4 cases for the tiller, 184.0 cases for the tractor, 76.6 cases for the combine harvester, 95.7 cases for the speed sprayer, and 10.0 cases for the portable cutter.

In terms of distribution by the types of farm machinery, accidents related to power-tillers represent 72.9% while accidents caused by tractors account for 21.5%. Therefore, the sum of accidents related to both tillers and tractors account for an absolute majority of 94.4%. This is attributable to the fact that more people own and use tractors and

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Table 2 Frequency of accidents by the types of farm machinery (frequency/10,000 vehicles)

Classification	Farm-work accidents	Traffic accidents	Total
Power tiller	107.4	22.0	129.4
Farm tractor	163.9	20.1	184.0
Combine harvester	73.0	3.6	76.6
Speed sprayer	95.7	-	95.7
Cultivator	8.9	0.4	9.3
Portable cutter	10.0	-	10.0
Transplanter	-	0.7	0.7
Average	65.5 (90.7)	6.7 (9.3)	72.2 (100)

Table 3 Distribution of accidents by agricultural machinery (%)

Classification	Farm-work accidents	Traffic accidents	Average
Power tiller	56.6	77.4	72.9
Farm tractor	28.3	19.6	21.5
Combine harvester	5.7	1.5	2.4
Speed sprayer	3.7	-	0.8
Cultivator	2.0	0.5	0.8
Portable cutter	3.7	-	0.8
Transplanter	-	1.0	0.8
Total	100	100	100

tillers, and their traffic grew into considerable amount of rural traffic (Table 3).

2. Locations of Farm Machinery Accidents

The breakdown of the locations where farm-work accidents occurred is as follows: 52.8% for farm road, 22.6% for paddy fields and dry fields, 9.6% for typical roadways, and

7.5% for field access/exit ways and village roads (Table 4). This distribution profile shows that most of the accidents broke out during the transportation and migration of the farm machinery.

About 58% of traffic accidents involving farm machinery occurred on the farm village roads, particularly at straight-lane crossroads, where no traffic lights are installed. Most

Table 4 Locations of farm-work accidents by farm machinery (%)

Paddy field	Field gateway	Road in village	Farm road	Road	Total
22.6	7.5	7.5	52.8	9.6	100

Table 5 Locations of traffic accidents by farm machinery (%)

Classification		Straight lane	Curved lane	Total
Accidents caused by farm machinery	Single roads	31.7	8.3	40.0
	Crossroads	58.3	1.7	60.0
	Total	90.0	10.0	100
Accidents caused by blank other vehicles	Single roads	59.7	13.4	73.1
	Crossroads	25.4	1.5	26.9
	Total	85.1	14.9	100

of the accidents turned out to be collision accidents with other vehicles during the course of crossing an intersection or making a turn (Table 5).

On the other hand, it was discovered that 59.1% of farm machinery accidents was attributed to collisions with other vehicles on single straight-lanes.

3. Types of Farm Machinery Accidents

In terms of the types of farm-work accidents, rollover and crash accidents accounted for a lion's share of 83.0%. These accidents took place either at farm roads or at field access/exit ways during the transportation and migration of the farm machinery. Meanwhile, the other 17% was accounted for by jolt and seizure accidents caused by belts or chains (Table 6).

Traffic accidents caused by farm machinery colliding and jolting with other vehicles accounted for 53.1% and 44.3% respectively, amounting to a total of 97.4% (Table 7). In particular, 80% of the accidents by the farm machinery resulted from collision accidents with other vehicles at crossroads and access roads to villages and farm roads. Meanwhile traffic mishaps caused by collision accidents

with other vehicles also accounted for a high rate of 56.0%. This is a consequence of the driver's poor understanding of the driving attributes of farm vehicles, as well as the absence of adequate lighting inside the farm vehicles.

4. Causes of Farm Machinery Accidents

Almost half, or 49.1%, of all farm-work accidents was due to driving errors or faults of farm machinery drivers. Another 26.4% was accounted for by the lack of dexterity of elderly drivers, particularly during contingency situations (Table 8).

According to distribution profile of the causes of traffic accidents, 83% of farm machinery mishaps were caused by the driver's lack of safe driving practices, violation of crossroad passing, median-lane trespassing, and violation of road traffic rules.

About 60.4% farm machinery damages were due to the driver's lack of safe driving practices, i.e., violations of safe distance requirement and of close lookout for front vehicles. Another 18.7% was accounted by wrongful outstripping/overtaking (Table 9).

Table 6 Types of farm-work accidents by farm machinery (%)

Classification	Power tiller	Farm tractor	Others	Average
Rollover	13.3	66.7	25.0	30.3
Crash	50.0	26.6	12.5	37.7
Collision	10.0	-	12.5	7.5
Blow	6.7	-	25.0	7.5
Jolt	6.7	-	12.5	5.7
Seizure	13.3	6.7	12.5	11.3
Total	100	100	100	100

Others: Combine harvester, Cultivator, Speed sprayer, Portable cutter

Table 7 Types of traffic accidents by farm machinery (%)

Classification	Collision	Jolting	Others	Total
Accidents caused by farm machinery	80.0	18.3	1.7	100
Accidents caused by other vehicles	41.0	56.0	3.0	100
Average	53.1	44.3	2.6	100

Others: Rollover, Falling

Table 8 Causes of farm-work accident by farm machinery (%)

Faulty driving	Unskilled driving	Unfamiliar Places	Mechanical problems	Drunk driving	Total
49.1	26.4	17.0	5.7	1.8	100

Table 9 Causes of traffic accidents by farm machinery

(%)

Classification	Accidents caused by farm machinery	Accidents caused by other vehicle	Average
Median lane trespassing	23.4	1.5	7.2
Violation of traffic rules at crossroads	29.8	7.5	13.3
Lack of safe driving practices	29.8	60.4	52.5
Violation of crossroad Passing	-	18.7	13.8
Drunk driving	2.1	8.2	6.6
Miscellaneous	14.9	3.7	6.6
Total	100	100	100

Miscellaneous: Falling asleep while driving, parking violation, speeding, overloading, etc

5. Distribution of Farm Machinery Accidents by Month and by Time of Day

Farm machinery accidents were clustered during May, the month for rice-planting, and November, the period for harvesting.

In terms of types of farm machinery, accidents involving farm tractors occurred at a high rate from March through June, the season for preparing and tilling the soil. On the other hand, over 10% of the accidents that involved power tillers occurred at a more even rate of over 10% every month from May through November.

During the course of the day, nearly half of the total farm-work accidents occurred during the day, i.e., 22.6% from 10am through 11am and 26.4% from 2pm through 3pm. The frequency of accidents during this time period is believed to be due to the fatigue factor built up during the

day's work. On the other hand, traffic accidents involving farm machines were highly distributed from 6pm through 7pm, which are usually rush hour periods after work and at sundown. (Figure 2)

6. The Casualty Count of Farm Machinery Accidents

The number of casualties resulting from accidents involving farm machinery stood at 1.39 persons per case, of which 0.07 persons succumbed to death, 0.74 persons sustained serious injuries, and 0.58 persons suffered slight injuries (Table 10). The death toll of traffic accidents involving farm machinery was 2.5 times greater than that of farm-work accidents. Overall, the number of death of farm machinery accidents caused by other vehicles stood at 0.06 persons per case, which is considered very fatal.

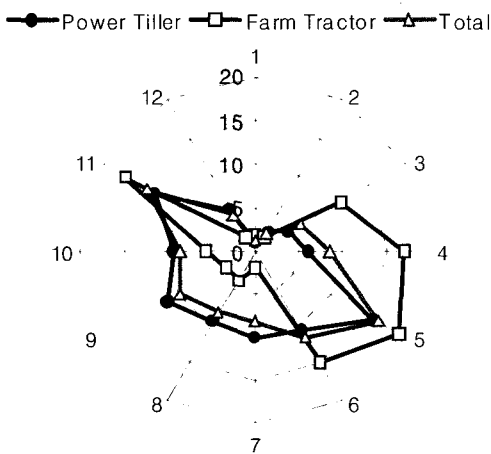


Fig. 1 Monthly distribution of accidents involving agricultural machinery (%).

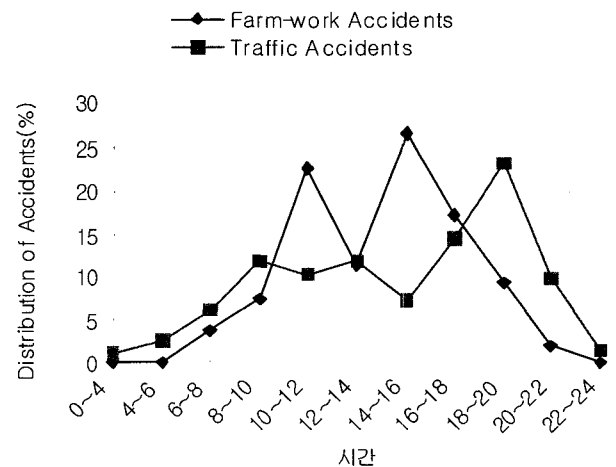


Fig. 2 Daily accident distribution of agricultural machinery (%).

Table 10 Number of deaths and injuries in the farm machinery accidents (Persons/Case)

Classification		Deaths	Severe injuries	Slight injuries	Total
Farm-work accidents		0.02	0.33	0.20	0.55
Traffic accidents	Accidents caused by farm machinery	0.02	0.13	0.28	0.43
	Accidents caused by other vehicles	0.06	0.53	0.42	1.01
	Sub-total	0.05	0.41	0.38	0.84
Total		0.07	0.74	0.58	1.39

Conclusions

The research findings and analysis results of this study pertaining to the realities of accidents involving farm machinery are summarized as follows:

- (1) About 94.4% of farm machinery accidents at work involved the use of the tiller and the tractor. The frequency of accidents out of 10,000 vehicles per annum is 129.4 for the tiller, 184.0 for the tractor, and 76.6 for the combine harvester.
- (2) In terms of types of accidents, 68% involved roll-over and crash accidents combined in farm-work accidents, 80% comprised farm machinery mishaps in traffic accidents, and 56.0% involved ramming into the rear by other vehicles.
- (3) The causes of accidents were, in order of significance, accidents due to careless driving of farm machinery vehicles (49.1%), driver's unskillfulness (26.4%), and delinquency of working conditions (17%). On the other hand, faulty driving or the driver's lack of safe driving practices was revealed as the major cause of traffic

accidents involving farm machinery.

- (4) The distribution of the average casualty count of 1.39 persons per case of farm machinery accident is as follows: the death toll (0.07 persons), serious injury (0.74 persons), and slight injury (0.58 persons).
- (5) To prevent farm machinery-related accidents, it is necessary for farmers to strengthen the education and information campaign of the safe usage of farm machinery, and to improve the working environment. Also farmers and automobile drivers should observe the traffic rules.

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