

# Strategies to Prevent Occupational Accidents in Agricultural Enterprises

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**Abstract**—This Agriculture has been in different user guides since the existence of mankind. Humanity is a profession that will continue to be done as long as it exists. The ghost, which is the condition of people's lives, is of great importance. With the development of technology in agricultural activities in the technological tools and equipment sector. The use of technological tools activates the work of the employees and brings the risks of accidents. Agriculture is one of the most dangerous sectors to consider these risks. The majority of accidents in the agricultural sector result in death, while the rechargeable part results in severe injury. According to the ILO, 170,000 people out of 1.3 billion agricultural workers are killed and a significant portion of them are seriously injured or suffered from occupational diseases. Chemicals used in agriculture and agricultural machinery accidents are the two main causes of death, injury and diseases in the sector.

This investment is occurring changes made in agricultural production. This is for broad literature review. It is necessary for the prevention of accidents by analyzing the obtained cases. In particular, it is stated that the minimization of preventable accidents will be through small measures to be taken.

**Keywords**—*agricultural production; occupational accidents; prevention strategies*

## I. INTRODUCTION

Agriculture has been in different user guides since the existence of mankind. Humanity is a profession that will continue to be done as long as it exists. The ghost, which is the condition of people's lives, is of great importance. With the development of technology in agricultural activities in the technological tools and equipment sector the use of technological tools activates the work of the employees and brings the risks of accidents. Agriculture is one of the most dangerous sectors to consider these risks. The majority of accidents in the agricultural sector result in death, while the rechargeable part results in severe injury. According to the ILO, 170,000 people out of 1.3 billion agricultural workers are killed and a significant portion of them are seriously injured or suffered from occupational diseases. Chemicals used in agriculture

and agricultural machinery accidents are the two main causes of death, injury and diseases in the sector [1].

Evaluate by country; In the UK, agriculture, fatal accidents and economic diseases are the worst economic sectors among the industrial sectors [2]. In France, due to very good social security in agriculture, accidents are generally decreasing. However, mechanization used in agriculture is the main cause of 25% of injuries in all accidents. The situation is much worse. In India, 46% of the major agricultural accidents were caused by tractors and because about 43% of those involved were killed [3]. Research in the United States reveals that 75% of important agricultural accidents are caused by tractors and tractor accidents constitute 1/3 of fatal accidents in agriculture [4].

In our country, information about agricultural accidents and thus tractor accidents is quite limited. In the study carried out in the Karaman region, it was determined that approximately 62% of the agricultural accidents that occurred in the region during the 20-year period between 1973 and 1993 were composed of tractor accidents and 65 people lost their lives as a result of these accidents. In addition, the tractor is an important risk source in agriculture, lack of technical knowledge of accidents, unintended use, unauthorized persons to drive, inadequate repair maintenance and so on. They stated that these elements can be solved with an effective training program [5].

Employees in the agricultural sector in Turkey, working alongside an employer or for a fee, or consists of producers located in its own name and account agricultural production activities. According to the basic labor indicators in September 2019, about 33.00 million, 28.44 million of the workforce are employed in Turkey, 5.58 million of those employed work in the agricultural sector [6]. In other words, about 20% of those employed in the agricultural sector in Turkey, It is known that the proportion of workers in agriculture is high and that agriculture includes intensive labor-intensive production methods such as animal production and crop production. In our country, it is another fact that the occupational accidents in the agricultural sector are high compared to other business branches. The rate of those who have had an occupational accident in the agricultural sector is around 2%, although it is not known. Due to the lack of social security in the majority of agricultural workers,

no precise data are available. Perhaps the most important of the current problems is the lack of recognition of the problem of occupational safety in agriculture due to the lack of statistical data. In Turkey, statistics in this area, not only in road accidents health problems or who lives insured agricultural workers with tractors or farm machinery is kept for drivers who are using accidents [7], [13].

The main reasons for the lack of occupational safety of agricultural workers show similarities in underdeveloped and developing countries. These include; agricultural workers are generally inadequate in their education levels, female and child workers are the majority, seasonal workers or high rates of displacement.

Although agriculture is at the forefront in all sectors in terms of accidents, it is seen that all of these accidents are preventable accidents. This is because machine manufacturers implement a wide range of measures, primarily considering the safety of users. In particular, keeping the tractor speeds at 30 km / h and the safety devices in the risky areas of agricultural machinery are examples of this. Tractors without cabs or guard bars are not permitted. It is equipped with air conditioning systems considering the comfort of the user even in machines operating in a very noisy and dusty environment such as combine harvester. Thus, the comfort of the user is provided while the quality of the work is increased. These examples can be increased. Because the tools used depending on very different pattern also differ. Risks increase accordingly. But to say that technological tools cause an accident would certainly be a false statement. Proper use will make it easier and minimize accident risks (Fig. 1).



Fig. 1. A cross-section of agricultural activities [1]

## II. ANALYSIS OF OCCUPATIONAL ACCIDENTS IN TECHNOLOGICAL VEHICLES

The short-term and inadequate training of the user involved in the after-sales services of new technological tools makes these tools even more risky. It is not possible to use the multifunctional vehicles correctly with the trainings taken in a short time. Due to the fact that most of the fields are in rural areas, there is not enough control. No unit is able to check whether the users of technological tools have received

adequate training. People of child age can use these tools for a short period of time and accidents occur in this short period of time. As in all sectors, accidents occur in very short periods of time in the agricultural sector. Assuming that these timeframes are irrevocable, the number of trained and knowledgeable employees should be increased. This will further reduce the risk of accidents. Persons of child age should continue their education and not be in risky areas [8].

Many different machines are used in agricultural activities due to differences in terrain and diversity of agriculture in Turkey. Tractors, sprayers, tillage machines, hoeing machines, sowing machines, fertilizer spreading machines, harvesting-threshing machines, mowers, balers, grinders, mixers and agricultural machinery can be mentioned as examples. Accidents occurring in the agricultural sector occur not only when working with these machines, but also in the processing steps of the machines such as repair, maintenance, repair adjustment, cleaning, and removing blockages [1], [7].

Agricultural activities are carried out in certain periods depending on many factors such as climate, plant pattern and topography. Particularly, climate-related activities are carried out in short periods of time and the lack of sufficient employees in this period causes serious concerns for producers. Thus, while being hasty in the conduct of the works, trying to make use of the uninformed and uneducated people, and even benefiting from the individuals at home brings the risks of accidents. It is possible to prevent these risks with good planning. Accident risks can be minimized in enterprises with sufficient machinery and employees. It is possible for enterprises to become more efficient by institutionalizing from family business. In this way, accident risks can be reduced or perhaps prevented.

The decision to use the pesticide should not be taken without consideration and should be part of a comprehensive risk assessment. If it is decided that a pesticide should be used, it must be ensured that it is applied as part of an integrated approach.

Plant protection products; fungicides, herbicides, insecticides and growth regulators in the use of plant protection products; Occupational health and safety rules for storage, transportation, use and disposal must be observed (Fig.2).



Fig. 2. Pesticide applications [1].

### III. RISK ANALYSIS IN THE APPLICATION OF CHEMICALS

Pesticide applications generally involve contact with more dilute substances than preparation and loading. However, since the exposure time is much longer, it should be noted that operators are at significant risk of exposure through both inhalation and skin contact. It would be appropriate to use less hazardous pesticides instead of very dangerous pesticides.

Outdoor spraying in minimum wind conditions prolonged contact with the pesticide spray increases the risk of skin exposure due to garment absorption. Knowing the processing time, suitable protective materials can be selected [1], [7].

Pesticide exposure may occur due to air movements caused by ventilation systems in operators applying spraying in the greenhouse. However, they can also use ventilation to their advantage to minimize exposure through training.

Significant exposure may occur by walking between the recently sprayed plants, contact of the skin and clothing with the leaves.

Breathing masks with appropriate filters of the applied pesticide and providing the necessary protection against pesticide exposure should be used. Surgical masks and glands covering the nose and mouth are not protective against inhalation of pesticide vapors and should not be used.

Safety goggles should be worn to reduce the risk of eye contamination with pesticide vapor.

Chemical protective gloves should be worn during pesticide applications. Gloves should be pesticide free before removal. During breaks, workers should remove the gloves so that the outer surfaces of the glove and their skin come into contact. Skin exposure during application usually occurs at the interface of gloves and clothing. Long gloves can provide additional protection to the forearms. The shoe must be pesticide free before removal. Shoes should be discarded when signs of wear or damage indicate that the shoes have lost their barrier properties. Normal shoes, including leather work boots, are not recommended for use as they will absorb pesticides and become a source of long-term exposure after application.

Clothing and personal protective equipment contaminated with pesticides during application remain a source of exposure to the skin until removed and washed thoroughly. Therefore, at the end of the application, all clothing and personal protective equipment should be removed and pesticide cleaned by appropriate methods.

The application equipment should be thoroughly cleaned at the end of the working period.

Used pesticide containers should be washed, punctured or crushed to prevent reuse and should be disposed of appropriately, preferably with a collection scheme or, if not available, by an authorized waste

disposal method. Under no circumstances should pesticide containers be used for storing substances, especially food and beverages.

Academic studies show that the highest mortality rate among tractors and agricultural machines is caused by tractors, threshing machines, agricultural machinery, plows and sprayers. It is also known that the main causes of these accidents are toppling, collision and impact [9].

### IV. CONCLUSION AND RECOMMENDATIONS

Much agricultural machinery contains potentially dangerous moving parts that can cause serious or fatal injuries. For example:

- Balers - harvesting machines, rope-tying mechanisms and movable rear bale exit doors,
- Rotary rollers, conveyors, elevators,
- Manure tankers - power shafts,
- Bale and straw choppers - chopping parts,
- Tractor connection mechanisms, power transmission (transmission mechanisms),
- Rotary harrows,
- Feeding lines - rotating parts in the mixing chamber (combine harvester, green feed input lines)
- Agricultural machines with moving parts have the power that employees cannot notice. For example:
  - When the tractor is connected to the hydraulic system and the connection arrangement of a machine being lifted continuously compresses a 10 cm diameter fence board, it can break it down into small splinter [10], [11].
  - Hydraulic oil leaking from a damaged machine hose with a pressure of approximately 206 bar can easily penetrate the skin with a syringe.
  - The power train shaft can wind clothing, hair, or arms at a speed of about 1.5 meters per second [10], [11].

A nationwide research on agricultural tool-machinery and tractor accidents; showed that a significant part of the accidents were caused by the lack of technical knowledge about the machine tool used by the employees [13]. Therefore; manufacturers and sellers, both in the sale and after-sale training of agricultural machinery, the technical characteristics of the machine to be used in agriculture, safe use methods, especially by emphasizing the safety of work and accidents, liflets will gain importance.

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