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Safe Use Of Tractors

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***Abstract*—Mankind has cultivated the land for many years to maintain its life. Its primary purpose was nutrition. As the world grew, their needs increased. He developed agricultural techniques to produce more, live better and lead a healthy life. The tractor, which is considered to be the most important invention in agriculture, took its place in agricultural production and provided the opportunity to use more mechanical power per workforce, thus reducing the workforce. He improved his social life by producing tractors, combines and many agricultural machineries in order to make his work easier over time.**

The tractor has become the symbol of development in today's agriculture and the basic tool of agricultural business. Tractors play an important role in increasing productivity in agricultural production. These machines are the biggest helpers of the farmers in many stages of production, from tillage to planting, from fertilizing to hoeing. However, accidents that may occur if care is not taken while using these machines unfortunately lead to irreparable injuries, disability and even death. There are important points to consider in order to be able to use tractors safely.

Within the scope of this study, the factors related to the safe use of tractors, which are used as the main power source in the agricultural sector, and their operation and risks within the scope of occupational safety were evaluated.

Keywords—tractor; agriculture; occupational safety; accidents.

I. INTRODUCTION

This Literally means tractor (Tracteur) pulling. In reality, tractors were originally intended only for towing work. Later, developments in agriculture and agricultural machinery have changed the tractor structure significantly. Today, modern tractors are used in multiple ways such as right-left detachable brake pedal, PTO, hydraulic systems, belt-pulley mechanism, safety cabins, front loader equipment, computer aided units, satellite system control mechanisms.

In agricultural production, the sector has its own unique working conditions. Tractors as the main power source are the most important tools in this sector. The risks that occur at every stage of the sector can sometimes consist of the tractor and sometimes the equipment connected to it. The studies carried out in this field show that [1],[2],[3] have shown that people occur in the form of reckless and careless behavior, and that most accidents are caused by tractors and agricultural implements connected to tractors [3][4].

Mankind has developed fertilization and plant growth methods to get more abundant crops in agricultural production. He discovered how to fight diseases and pests. Because while all these studies increased production, they brought many factors that threaten the environment, plants and human health. Today, studies are carried out to produce plants that will not cause environmental problems in a way that will not harm human health. However, the most important risk in the agricultural sector is non-compliance with occupational safety rules. Working with very powerful, heavy and noisy agricultural machines and using some chemicals bring risks to the workers in the agricultural sector. Unfortunately, those working in these segments are not aware of these risks. Today, it is known that every household in Anatolia has experienced an accident in the past. As individuals perish, hopeful lives come to an end. Despite the precautions taken, accidents cannot be prevented. The protection of employees in the sector from risks in the short and long term will only be possible by raising awareness about occupational safety in agriculture and undergoing training.

There are many short and long-term risks, from agricultural machinery accidents and pesticide poisoning, loss of hearing and vision due to noise and dust, allergic diseases such as asthma, tick bites, bird flu, and diseases transmitted from animals to humans. Farmer families, especially their children, are at risk, as the working areas of the farmers and their living areas are often intertwined. By taking simple precautions such as having information about the machine used, using a tractor with a cabin, not removing the casings of agricultural machinery, especially the shafts, changing the old casings, not leaving the tractor without being in a safe position, wearing a mask in case of exposure to dust during spraying, wearing gloves and suitable protective clothing when necessary. , both ourselves, our family and the lives of the people around us can be protected. Although it is very painful, most of those who lost their lives in accidents in the agricultural sector are first-degree relatives of the person who made the accident [1], [2]. A life can be saved with many safety measures that we know but do not implement. By following the rules, it will be possible to save both your life and the lives around you.

II. OCCUPATIONAL SAFETY IN TRACTOR

First of all, the person who will use the tractor should have knowledge about the tractor he will use. For this, the maintenance and user manual of the tractor must be read. The rules outlined here should be followed carefully. It is extremely important for safety that the operator knows all the features of the tractor. For example, the absence of a protective structure against the tractor from overturning means that an accident will likely result in death. For this reason, protective structures such as cabin and safety frame must be present in the tractor used. If there is only a safety frame on the tractor, it is absolutely necessary to wear a safety belt. We should not neglect to wear seat belts while working. In addition, careful driving must be done at points such as pits, canal edges and hills where the tractor can tip over. Because a very large part of tractor accidents occurs when the balance of the tractor is lost. It is necessary to make sure that there is no leakage in the exhaust system of the tractor used. Because toxic emissions from the exhaust system pose a threat to human and environmental safety [5,6,7]. When the tractor is operated in a closed area, it is necessary to open the doors and windows or operate the ventilation systems and ventilate the environment. It is necessary to have a fire extinguisher and first aid kit in each tractor. There are things to be done before getting on the tractor for safe tractor use. First of all, before starting work, it is necessary to go around the tractor and make sure that there is no person or living thing nearby. All lighting lamps and braking equipment of the tractor must be in working order. Because the braking system should be able to stop the vehicle safely under different conditions [8,9,10]. Also, make sure that the tire pressures are correct and that the tire is solid. While getting on the tractor, care should be taken to clean the steps of the tractor from substances such as mud and plant residues that will cause slipping. It is necessary to make the brake adjustments of the tractor regularly. Both brake pedals must be locked before hitting the highways. It is ensured that the yellow flashing safety light is turned on while driving on the highways with the tractor. Otherwise it must be installed. In addition, in order to be visible in the dark, the equipment pulled by the tractor must have a lighting, signal and reflector system. Otherwise, many accidents can be caused on the highways. If an equipment is to be towed with the tractor, the safety pin and chain must be used. If the load is to be transported, the load must be attached to the drawbar. If the load is too high, care should be taken when passing through high voltage lines. It is extremely wrong to transport passengers with a tractor. These vehicles are not passenger transport vehicles. Suspended equipment must be lowered before leaving the tractor. The ignition key should not be left on the tractor for the safety of you and those around you. Accidents occur quite often when uninformed people start the tractor while you are away. This has serious consequences. When farmers comply with these specified points, both the farmers and those around you will be safe.

Safe stop is the most important work safety action in an abnormal operation or in a situation that needs to be noticed while working on tractors and agricultural machines. The safe way of stopping is in 4 stages. These;

1-Making sure that the handbrake is applied for moving equipment,

2- Ensuring that all command levers such as gear levers are in a safe position, this includes lowering the equipment if equipment is connected to the hydraulic levers, and disengaging the PTO clutches,

3-Stop the engine, cut off the power,

4- It is to take the ignition key from the machine.

When there is an abnormal situation when working in the field or garden with the machine, for example when there is an odor or a sound, when someone approaches the machine before the operator leaves his seat, when someone is dealing with a machine connected to the tractor, the previous situation applies. Correctly performing the safe stop is of great importance for blockages that occur during operation. For example, when working with a forage harvester, the safety stop rules must be strictly followed during clogging. Because the knives of the silage machine, which is stopped during operation, may take 5 minutes to stop. Again, serious injury or death can occur if many people are crushed by an improperly parked tractor or agricultural machinery while the engine is running or not [2]. These are caused by the handbrake not being applied well or being faulty. Farmers should be placed in a safe parking position, even during short breaks. Otherwise, people who are not aware of this danger may be seriously injured [4] and die by being caught in the rotating part of the shaft and machine. It should be noted that safe stopping saves lives.

It is a fact that it is almost impossible to get rid of the rollover accidents that occur in tractors without a cab or without a rollover protection structure. Every year, dozens of people, small and large, lose their lives in these accidents. When we look at the reasons; Tractors are tipped sideways and backwards. While the tractor is used on steep slopes, it happens when the front loader is lifted too high with a certain load on steep slopes. Rolling over while in use can occur during sudden cornering and when the tractor is driven close to a pothole, ditch, or slope on the roadside. Especially when going downhill, in case of unsuitable and over-capacity loads and the operator's insufficient knowledge of the agricultural car and tractor balance, the wrong use of the tractor causes the agricultural car to push the tractor after a certain speed. In order to avoid tipping over while using the tractor, the tractor wheel track width should be large, the tractor should be equipped with a suitable weight, and the operator who uses the tractor should be aware of the environmental conditions. Rolling back on tractors is

usually caused by incorrect coupling of the load to the tractor. For this reason, the load is properly connected to the drawbar. It should be noted that there is no safer place on the tractor's rear axle to tie the load apart from the drawbar. In order to avoid the effects of overturning, the terrain conditions should always be taken into account when using the tractor. It is necessary to be careful when passing through places such as logs and rocks on rough terrain, in canals on very sloped places. The use of the tractor along streams and pits should be avoided. Because the soil strips here are very likely to collapse with the weight of the tractor. The gear should not be put into neutral while going downhill. The brake pedal must be locked while driving on highways [11]. Overturns on tractors happen in less than a second. In such a case, the operator does not have enough time to recover [3], [4]. Cabins, safety frames or protection bars in accordance with the standards in your tractor will be the situation that will protect the driver from death and serious injury during the rollover. For safety, tractors with cabins and tractors with safety frames should be used. If your tractor does not have such a structure, it must be fitted. These structures will keep you in the safe area. It should not be forgotten that the structures installed with a small expenditure ensure the survival of the driver. It is important to remember that cab tractors save lives. Tractor accidents occur in the months when agricultural activities are intense [1], [2]. In order to reduce the fatality rate in tractor accidents, tractor rolling cabins (ROPS) and safety belts are used in developed countries [12].

III. Conclusion and Discussion

It includes both intensive and unique working conditions in its agricultural activities. The agricultural sector has a dynamic structure with its unique aspects due to its nature. It includes many differences from other sectors in terms of working conditions, lifestyles, business and social environment. It is one of the rare sectors that are generally family businesses, and the way and conditions of work are formed by themselves. Considering the safety factor of the engineer during the design of the machine will reduce the accidents [1].

Agricultural activities in areas far from control are generally carried out by tractors. Employees in these sectors must have tractor operating skills and licenses. All tools should have sufficient knowledge about the use of machines. It is imperative to know all the rules and regulations related to occupational safety. Legal arrangements made in order to increase the socio-economic welfare of the workers in the agricultural sector, which is among the sectors with high rates of informality and the rate of young workers and occupational safety in agriculture, did not sufficiently affect the workers and their living standards [11],[13]. It still continues as a problem in rural areas such as short and long working hours according to the season, work intensity, educated and equipped personnel, socio-economic structure, widespread employment of child workers, a lifestyle far from social security, and occupational accidents.

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