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**The Evaluation of Occupational Health and Safety in Turkey Agriculture Sector****Osman Gökdoğan\*, Oktay Erdoğan**

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**Abstract** In this study, the status of occupational health and safety in the agricultural sector in Turkey were investigated. The material of the study comprised of study guides and other studies related to the subject. With regards to occupational health and safety risks in agriculture, tractors, agricultural machines, physical risk factors, chemical risk factors, ergonomic and animal risks have been examined and measures related to occupational safety in agriculture have been discussed. In conclusion, it has been determined that most of the occupational accidents in agricultural sector are related to the use of tractor. The reasons for tractor related accidents are defined to be carelessness of operators, disregarding safety rules, non-maintenance of tractors/agricultural machines and lack of knowledge about the tractors/agricultural machines used. In order to ensure that the efforts for reducing the number of accidents in agricultural sector can reach greater masses, it is highly important that extensive educational efforts are made through television and continuous visual and printed publications are prepared to prevent agricultural labour accidents.

**Keywords** Agriculture sector, Occupational health and safety, Tractor accidents, Turkey

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**Introduction**

According to the Organisation for Economic Cooperation and Development (OECD) Assessment report, Turkey has been announced as the 7<sup>th</sup> greatest and important agricultural producer of the world. Due to its close relations with employment, foreign trade and other sectors of the economy, agricultural sector in Turkey has a socio-economic importance [1, 2]. In the 2015 data of the Turkish Statistical Institute's (TSI) Household Labour Statistics, the number of people employed has been declared as 27 million 261 thousand. 22% of this data is employed in agriculture [2, 3]. According to the Annex of the Cabinet Decision on Implementing, Coordination and Monitoring of the 2015 Program, dated and numbered 30 September 2014-2014/6841 and published in the Official Journal dated 17 October 2014, no 29148, the share of the agricultural sector in 2013 within the Gross Domestic Product (GDP) has been announced as 8.3%. Just like in the rest of the world, agricultural sector is one of the most important ones in Turkey as it provides raw materials for the industry and considerable export revenues [2].

Making up 15% of our national income and 45% of employment, agricultural sector maintains its status of being an economic and social sector due to its direct relation with food production and nutrition, high values in active population and labour force, contribution to national income and raw materials and capital provided for industry, helping to establish and maintain a healthy environment, establishing and sustaining an ecologic balance, and concerning the whole the nation [4].

Along with construction and mining, agricultural sector is one of the most hazardous professions in the world. According to Food and Agriculture Organization (FAO)'s 2011 data, the total number of employees in agricultural sector worldwide is 1.3 billion. This data corresponds to 40% of the total labour force in the world (On the basis of Food and Agriculture Organization's 2011 data where the total number of worldwide



employees is stated as 3.3 billion). According to International Labour Organization's (ILO) 2015 report, the share of agriculture in world employment has reduced from 40.5% in 2010 to 37.5% in 2014 [5].

### **Occupational Health and Safety in Agricultural Sector**

The health and safety issues encountered by agricultural workers are quite similar. Agricultural workers can face physical, chemical, biologic, ergonomic and psycho-social factors in their working environments. The risk of agricultural workers encountering occupational accidents and suffering from vocational diseases is quite high [2].

The kind of health and safety issues that can be encountered in agricultural sector are various. The diseases, injuries and accidents that are or can possibly be seen in agricultural workers can be listed as follows; severe mechanical risks that are caused by the use of vehicles, tools, tractor and agricultural machines and can lead to death or loss of limb, different types of cancers, respiratory tract diseases, dermatologic diseases, animal-related accidents and diseases, being subjected to pesticides and other chemicals, being subjected to dust, making contact with hazardous plants and biologic matters, contagious and parasitic diseases, being subjected to noise and loss of hearing, being subjected to vibration and its consequences, lifting heavy materials, recurring movements and similar ergonomic problems as well as musculoskeletal system diseases, extreme cold/heat and other similar negative climate conditions, thermal risks, psycho-social factors and stress [2].

### **Basic Occupational and Occupational Safety Risks**

#### ***Tractor and Agricultural Machines***

Tractors and agricultural machines used during agricultural activities are among the leading causes of accidents experienced in this sector. Further to the use of tractors in agricultural activities, several different agricultural tools and machines are being used and these are also among the leading causes of the accidents that happen. The use of agricultural tools and machines include the cultivation of soil throughout agricultural production, sowing, maintaining and fertilising procedures, disinfection and crop-harvest works and handling and transporting in and outside the enterprise. In this context, agricultural tools and machines can be grouped into soil cultivation tools and machines, sowing machines, fertiliser distribution machines, hoeing machines; spraying machines, harvesting machines and handling equipment and agricultural vehicles. Occupational accidents in agriculture and the consequent deaths or injuries are not only taking place when working with tractors and different types of agricultural tools and machines, but they are also seen when such machines are being repaired, maintained, adjusted or cleaned [6]. The fact that the population in agricultural areas have a low education level and the unconscious use of agricultural machines lead to the risk of accidents in Turkey. As well as loss of labour, the occupational accidents in agriculture are also causing monetary losses, deaths and injuries [7]. Providing hands-on training to agricultural labourers on various issues such as the safe and correct usage of machinery and increasing the other information sources will help reducing possible accident risks [2].

### **Physical Risk Factors**

#### ***Noise***

Noise is generally described as unwanted, irritating sound. Noise in industry however, is described as sounds that negatively affect the hearing health and perception of workers in their workplaces, leaving physiologic and psychological effects and impacting the labour productivity [8, 9, 10, 11]. The effect of noise on human health can be mainly examined in four sections. These are; physical effects in the form of hearing damages, physiological effects seen in the bodily activities, psychological effects such as uneasiness, rage and performance-related effects such as loss of productivity, being unable to perceive the sounds [8, 11]. Technical, medical and administrative measures need to be taken to ensure protection against noise related risks. Priority must be given to collective protection and in cases where noise level cannot be reduced to below limit values with this, personal protective equipment need to be used. Earbuds or plugs are being used as personal protective equipment against noise [2].



### ***Vibration***

The medical impacts of hand-arm vibration are; white finger syndrome (deteriorated blood circulation), numbness in fingers and loss in sense of touch (damaged hand nerves, being unable to perceive objects by touching, being unable to feel heat by touching), loss of strength, damaged joints, pain and stiffness in hand and arm joints, all due to damaged nerves and muscles in hands and arms. The first measure to strike the mind to remove or minimize the negative effects of vibration on health is insulation. However, there are significant insulation issues in agricultural machines. Vibration must be eliminated at source. With this in mind, the design and placement of machines must be made correctly. In cases where exposure to vibration cannot be prevented or reduced through other measures, hand protectors reducing (absorbing) vibration could be used [2].

### ***Thermal Comfort***

Thermal comfort is used to describe the certain level of comfort of the majority of workers in their working environment, in terms of climatic conditions such as temperature, moisture, air flow when performing their physical and mental activities. Slight changes in bodily temperature have an effect on physical and mental functions. The optimum condition temperature under working conditions is 18-24°C and in temperatures over 24°C physical fatigue starts and in temperatures outside the range of 10-30°C, mental effectiveness, hand strength and sensitivity to touch is reduced. The optimum level of air moisture in a working environment should be between 30-70% [2].

### ***Lighting***

Workplace and working environment needs to be illuminated in accordance with the work being performed. Having a suitable and sufficient lighting not only psychologically affects the workers but it also helps to increase work productivity. Lighting is as important as other physical factors particularly in terms of preventing occupational accidents. Having insufficient lighting in a workplace can lead to fatigue, reluctance and carelessness, eye conditions and headaches among workers. Lighting can be done through natural or artificial means [2].

### **Chemical Risk Factors**

#### ***Pesticides***

The term pesticide covers all of the plant protection products categorized as insecticide, herbicide, fungicide, acaricide, rodenticide etc. [2]. The most effective means of protection are technical protection applications. In order to prevent exposure through respiration, ventilation systems need to be established and masks need to be used where necessary. Masks should also be used during the application of pesticide. Pesticides need to be applied when there is no wind, or wind needs to be blowing from the back when spraying. To avoid skin exposure, the back-carry tank need to be well-examined to ensure there is no leakage and leak-proof clothing must be worn during application. Furthermore, at work commencement and at certain intervals during exposure the blood must be examined to confirm there is no cholinesterase activity [4].

#### ***Gas and Dust***

The gases and dust that those working in the agricultural sector are exposed to can be formed in silage depots and green feed depots. Furthermore, biologic dust is formed when green feed, grain and plant residues at animal shelters are being processed, and these can lead to health problems in the eye, lungs and disease. The effects of such toxic gas and dusts are significant in greenhouses, silos and similar indoor workplaces as well as uninsulated cabins. Structural changes to be made in the engine and use of masks with a ventilation filter will be reducing these effects. Ventilation must be made for any works performed indoors [2].

### ***Ergonomics***

Ergonomic features refer to the conditions that are expressed to be most suitable for one to work productively and comfortably. There are some simple but effective means of solution to prevent the ergonomic complaints which are the issues most commonly encountered by those working in the agricultural sector. Some of these



solutions are; keeping the working tools below the shoulder-level, having sufficient resting time between recurring works, rotating between workers, lifting objects by taking support from legs, keeping close to the fruits/vegetables being collected, making smaller stacks rather than lifting heavier piles, using specially designed carriages/trolleys/palletes when lifting heavy objects, avoiding single-handedly lifting heavy objects, attaching ergonomic and suitable handles to the hand tools to be used [2].

### Overview

It has been reported that the cost of the accidents in agricultural sector in Turkey is 81% more than the accidents taking place in other sectors, tractor is the main factor of the accidents taking place in agricultural sector and on average, there is one tractor-related accident taking place in Turkey in every week [6]. 33% of the tractor-related accidents are due to losing balance on a tractor. And losing balance is caused when the slope angle is higher than the roll-over angle, in high speeds, in non-suitable terrain and when the command of the steering wheel is lost [4, 12].

During the year 2005, 1054261 vehicles have been involved in traffic accidents in Turkey. During the same period, 2833 tractors have been involved in various accidents. However, some of the accidents involving tractors are considered as occupational accidents, therefore the related data is not very healthy [13, 14]. It has been reported that of all the tractor-based accidents in Turkey, more than half is due to rolling-over/tumbling/falling into ditches (60%), some due to being hit by a tractor or colliding with another vehicle (25%), some due to falling off a tractor (6%), being run over by a tractor (6%), being crushed by a tractor (2%) and others (1%) [14, 15].

Out of the 1167 agricultural machine accidents in Turkey, 74% are caused by man, 16% by machines and 10% by ambient conditions. Furthermore, it has been reported that out of the 880 tractor-related accidents, 83% were caused by man, 7% by machine and 10% by ambient conditions [14, 15]. Occupational health and safety in agricultural sector is an issue too important to be neglected, in terms of both economy and employment. The occupational health and safety problems that can possibly be encountered in this area are skin diseases, respiratory diseases, musculoskeletal disorders that can develop due to physical, chemical, ergonomic and psycho-social risks in labourers, as well as some serious accidents and injuries. On the other hand, workers are experiencing serious problems in terms of accessing health services as agricultural lands are generally far away from central locations. This is causing major issues when emergency intervention is needed and in addition, monitoring of vocational diseases is really difficult. Therefore, the organization of occupational health and safety services is highly important [2].

In conclusion, most of the agricultural enterprises operating in Turkey are family businesses. In this sense, family members are under a great risk of accident. In order to minimize the risk of accidents, training activities on occupational health and safety must be performed in agricultural enterprises. Ensuring that the relevant efforts are spread to masses is very important to help minimize agricultural accidents. Therefore, training must be provided through television programs, visual and printed publications must be circulated. In their R&D and design activities, companies producing agricultural machines need to take into account the agricultural accidents that have taken place and develop safety systems in line with such accidents [7]. Provincial Directorates of Agriculture and Forestry must establish occupational health and safety (OHS) teams in places where agricultural activities are taking place. Such OHS teams need to pay regular visits to agricultural sites and inform people on the issues of using agricultural machines and agricultural disinfection. This way, it will be possible to minimize the risks of the most common accident and disease risks in agricultural activities [16].

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