

# Occupational hygiene in field farming

Kasimov Hayriddin Olimovich<sup>1</sup>, Manasova Izimgul Serdanovna. Nazarov Sulton Erkinovich.  
Jumaeva Zukho Jurayevna. Nurova Zarnigor .Hikmatovna

**Abstract:** *This article aims to study the criteria for hygienic assessment of workers' labor in the context of field farming. In field farming conditions, heavy physical labor can be affected by production factors such as dust, noise, vibration, exhaust fumes, sunlight in summer, cold temperatures in autumn and winter, mineral fertilizers and pesticides, vapors and gases. Therefore, the sanitary control of working conditions of workers in field farming is required to take into account the characteristics and factors of the production process. In this article, the goal of the study is a hygienic assessment of the working conditions of field workers*

**Keywords:** *hygiene requirements working condition production factors, manual labor.*

## I. INTRODUCTION

It has been established that in crop production conditions, such factors as high physical activity, dustiness, noise, vibration, oxides, carbon, insolation in the summer, relatively low temperatures in the autumn-winter period, vapors and gases of mineral fertilizers and pesticides can affect workers. In connection with this, sanitary supervision of the working conditions of workers engaged in field farming should be carried out taking into account the specific features of its technology and production factors.

The working conditions of field farming are inextricably linked with the mechanization of agricultural work, the use of techniques in the care of plants and its technology, as well as the organization of the work process.

Plant growing the basis of the mechanization of all mobile equipment used in the implementation of agro-technical measures. [5].

In recent years, our country has begun to develop highly technically advanced agricultural machinery. In particular, the introduction of high-yielding techniques in agriculture is a clear proof of our opinion.

These include T- 70-60, Arion 630, Arion 850, Puma-310, MX-240, MX - 255, Maxum, Magnum, Valtra and others.

Above those tractors booths from 2 to 3.5m<sup>3</sup>. The cabs of Magnum, Arion 630, 850 tractors are designed for two people. This in turn facilitates unit management and road traffic.

T - 70-60, Arion 630.650, Maksud, Walter, MX-240, 255 tractors booths heating-x Sit air switcher systems, drugs, clothes hanger, wheeled switch window a cleaner drinking water supplied with the equipment. In order to facilitate access to the cabin, their control system (steering wheel) is equipped with rear, front, chip sliding equipment B, in turn, will - according to the working rouged I will be able to change a few times.

Seats installed in tractor cabs form the basis of workplaces. The industrial production of such equipment, seats, control system and control mechanism equipped with booths.

In all agricultural machinery, the cabs are located behind the engine and there are some difficulties in operating them. In addition, the engine in front of the cab is a source of high levels of heat, noise and vibration, which worsens the working conditions of machine operators. Most of the tractor cabs are glazed, and some machinery has additional windows installed at the bottom of the cab to control the operation between rows and to monitor the operation of the

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<sup>1</sup> **Affiliation:** Bukhara State Medical Institute, Bukhara. Uzbekistan

**Affiliation:** Bukhara State Medical Institute, Bukhara. Uzbekistan

**Affiliation:** Bukhara State Medical Institute, Bukhara. Uzbekistan

**Author:** **Affiliation:** Bukhara State Medical Institute, Bukhara. Uzbekistan

**Affiliation:** Bukhara State Medical Institute, Bukhara. Uzbekistan.

wheels. However, covering the cabins with excessive glass allows hot air to enter from the solar radiation bed. [10, 15, 21, 24, 25, 27].

Seats depend on the length of the body and the ability to change the working position. They are equipped with a control mechanism to adjust the seat to the height and weight of the machine. The short mechanics lowered the seats using a pedal and pushed back.

With the help of a special device mounted on the seat, machine operators change the working condition from time to time, which in turn has a positive effect on the feeling and performance of machine operators. [13.17].

In some agricultural machinery, the seats do not meet the established standards. For example, the seats of MTZ 80, 82, T-28m, T-4 tractors are small, they have low supports. Such a seat is not controlled. As a result, such a situation leads to rapid fatigue of machine operators. [7, 9, 19].

The mechanics control the work process in a sitting position. The norm of working condition has a positive effect on the efficiency of labor activity and the health of machine operators.

The above ideas, we can conclude that the improvement of modern agricultural technology, jobs at the machine to create the appropriate conditions for the seats and automatic control mechanisms in accordance with the installation and equipment management mechanism plays an important role in the introduction.

**The purpose of the work:** The hygienic assessment of the factors of production that occur in the conditions of field farming, their impact on field workers and the development of measures to protect the organism of workers from these factors .

## II. OBJECTS AND METHODS OF CONTROL

The main object of this research was the scientific substantiation of the working conditions of cotton workers, measures to protect them from inappropriate factors of agricultural production. The main conditions of the country's agriculture jobs can be a chemical, physical, and biological factors, weight and intensity of the process and the ability of their workers and health effects.

The working conditions of field workers were studied in all seasons (spring, summer, autumn, winter). During the whole working day, the microclimate, parameters, dust, gases and the level of microbial contamination of the air, noise and vibration factors were studied.

## III. RESEARCH RESULTS AND THEIR DISCUSSION

Working conditions in field farming are inextricably linked with the mechanization of agricultural work, the use of techniques in the care of plants and the level of its technology and organization of the work process. Mechanization of plant care the basis of all technical measures to increase the countdown use of mobile equipment. [5, 6, 21].

In recent years, our Republic has launched the production of highly technically advanced agricultural machinery.

The cabins of agricultural machinery are designed to directly protect machine operators from the weather, to create a moderate microclimate in the workplace. Naturally, machine operators cannot be protected from high levels of heat or cold air without adequate insulation of metal cabins.

Heat sources in tractor cabins are: solar radiation (70-80%), engines (8-15%), machine operators (10-15%) and other mechanisms (3-8%).

Our inspections show that in the cabins of equipment without a thermal protection layer, the air temperature was finally extremely high during the hot season. See (Table 1).

**Some of the agricultural machinery and the cockpit temperature classification**

Models	Outdoor air temperature, degrees °C	Temperature in cabins, degrees °C
Z-80	5	5
8	5	4
	5	7
0	5	8
Z-80	5	8

Due to the high temperature of the cabs, the mechanics have to open the doors and windows of the tractors. This in turn leads to an increase in the level of dust in the cabins.

Today, all measures of heat protection are taken in industrially produced equipment. Their booths are lined with clear-painted cardboard and they protect from solar radiation.

In addition, air conditioners installed in the cockpit of this technique. The windows are covered with dark paint. These in turn provides a moderate microclimate of the cockpit and the mechanics of Solar him Idea (Table 2).

Table 2

**Industrial equipment developed on the basis of booths and the classification of the surface temperature of the outside temperature (38-45 °C).**

Models of techniques	Temperature °C			
			front part	door
0-60				
n630				
n850				
a				
num				

Thus, the outer surface temperature of the cockpit in many cases cabin associated with the inside temperature, however, will not be playing in the performance of the engine and the temperature due to the floor temperature is higher than in other parts of the surface.

The microclimate in the cabins of agricultural machinery, designed on an industrial basis and equipped with air conditioners, is related to the external weather conditions (Table 3).

Table 3

**Equipment cabinets equipped with air conditioners. The microclimate is related to the external meteorological conditions.**

Models	Floor furniture conditions			Conditioned cabins		
	temperature °C	humidity	temperature	temperature °C	humidity	temperature °C
0-60	-37.2	8	1.9	0 -25 .0	0	1.3
n630	-37.3	7	1.8	-26.0	2	1.2

n850	-37.0	4	1.5	-27.2	60	1.2
a	-37.1	4	1.3	-27.0	1	1.2
num	-36.2	-41.2	1.1	-24.2	2	1.4
	-38.3	2	1.8	-27.2	2	2.1
	-38.2	2.1	1.3	-28.0	8	1.6

Air supply to the tractor cabs for air conditioning is provided from above using a special rubber device. This condition does not ensure a uniform supply of air to the cabin. As a result, the machine operator may cause the exposed part of the body to sag [4, 5, 6].

Special devices or air conditioners are used to provide heat to the tractor cabs. Cabin heating is often used as a tractor engine or as a heat source (MX, Arion 630, 850, Magnum).

On cold winter days (outdoor temperature -5-10 °C) the temperature in the cabs of MX, Magnum, Arion 630, 850 tractors is +15 +20 °C. The disadvantage of heating the cabin or in the method named above is that it is not possible to control the heat level. In addition, heat is not evenly distributed in the cabin because heat is supplied from above [23, 24, 27, 29].

In order to improve the microclimate conditions in the cabins of agricultural machines, technical means are used, such as air exchangers, artificial heating during the winter. In most cases, opaque screens, awnings, protective glass can be used for thermal protection. Painted in a light color as a heat shield, the metal screen installation is more efficient. Covering the cabin floor with a rubber mat protects it from heat until it comes out of the engine. Installing an artificial air exchanger in a tractor cab is an effective way to protect against heat. The scientists' investigation showed that when air was sent into the cabin at a speed of 2.2 m /per sec. The temperature in the cabin was 20-25 °C, even when the outside air temperature was 35-40 °C [12, 23, 27].

Another way to protect tractor drivers from heat is to properly organize work and rest schedules. In our hot climate, work should continue from 5:30 a.m. to 11:00 a.m. and from 16:00 p.m. to 20:00 p.m.

At the same time, it is important to provide agricultural workers with cotton fiber work clothes.

This fabric absorbs sweat, breathes well and dries quickly.

Proper drinking arrangements are important to protect workers from heat. To do this, it is advisable to organize green tea for workers, various tinctures, liquids enriched with vitamins (A, B, RR, C).

Along with this, it is worth strengthening the body through various exercises outside of work [12, 13, 14].

One of the factors that can affect the mechanization of agricultural machinery is dust. Dust enters the tractor cabs through leaking cab floors, windows, doors and technically faulty air exchangers. The amount of dust entering the cabins is directly related to the level of soil moisture, movement and air speed [1, 2, 5, 6, 7, 12, 15].

The dust gathered from different parts of the technical booth after they appear and as a result of movement of the tractor as a result of the vibration machine to breathe members around the gathering of large concentrations (XTZ 80, MTZ 80, 82, T-28).

During laboratory tests, the amount of dust in the cabs of KhTZ-80, MTZ-80.82, T-28 during plowing, leveling and the creation of furrows was 40-45 mg / m<sup>3</sup>, which is 7-8 times higher than the established norm.

However, due to the tightness of the cabins of Arion 630, 850, Magnum, MX equipment, which are equipped with air conditioners, the concentration of dust in their cabins is 10-12 mg / m<sup>3</sup> (Table 4).

Table 4

**Indicators of the amount of dust in the cabins of some technicians**

levels of techniques	amount of dust in the outside air	amount of dust in the cabins is mg / m <sup>3</sup>
XTZ 80	5	2
MTZ 82	2	8
T-28	1	6
Arion 630	5	5
Arion 850	4	
Magnum	2	4
	4	

We divided all mechanized agricultural work into 3 groups based on the level of dust in the workplace:

- High level of pollution (54-62mg / m<sup>3</sup>) during the first group work. B band playing in the dust they XTZ 80, MTZ 80, MTZ 82, T-28, the Arion 630, Arion 850, Magnum tractors expulsion of a leveling, but dust that forms during furrows.

- The level of pollution during the work of the second group is moderate (36 -38 mg / m<sup>3</sup>). This group of dust generators includes vegetable and cotton dust generated by XTZ 80, MTZ 80, MTZ 85, T-28 tractors.

The dust level is low (20-25 mg / m<sup>3</sup>) during the third group of studies. This group of dust sources includes tractors T-40, MX, Magnum, Belarus 1221, TTZ-80, 10, MTZ-52, which perform transport functions.

The amount of dust in the workplace of machine operators varies during the working day. The dust level when the equipment is moving against the direction of the wind is low, their number is several times higher when moving along the direction of the wind. In addition, the amount of dust generated at the driver's workplaces depends on the type of crops being cultivated and the level of precipitation [1, 5, 12, 13, 14].

From the foregoing, it can be concluded that the use of various models of agricultural machinery (old models T-28, MTZ 80, MTZ 85) creates dust in the workplaces of machine operators, which can lead to pathological processes in the body, occupational diseases of personnel [7, 8, 12.15].

Dust can affect the health of agricultural workers throughout the year. Dust can penetrate the respiratory system of workers and cause bronchitis, pneumoconiosis.

Field workers in the preparation of agricultural land for planting, tillage between them, the collection of plant residues are exposed to soil and plant dust.

It is important to protect agricultural workers from dust generated on the basis of agricultural production technology.

The introduction of a mechanized, automated method of farming is the basis for reducing the amount of dust in the workplace.

Providing workers working in dusty environments with special clothing and personal respiratory protection is very effective. Personal protective equipment includes dust respirators: Lepestok-200, Lepestok-40, Lepestok-5, F-62M, F-46AS, U-2K, Astra-2.

In the prevention of pneumoconiosis, increasing the resistance of the working organism is of particular importance. Among such measures, it is important to give the body ultraviolet light. Ultraviolet rays slow the onset of sclerotic processes in the lungs.

In addition, alkaline inhalation in the respiratory system can help reduce pneumoconiosis. Providing workers with high protein foods (especially methionine) is essential for the prevention of pneumoconiosis.

During the movement of agricultural machinery in the workplace, noise. The level of noise generation by technology depends on the strength or ease of work performed using engine power. Depending on the origin, the noise generated by the work of agricultural machinery will be mechanical and aerodynamic.

Mechanical noise is caused by moving parts of the equipment that collide with each other due to technical failure of parts.

Aerodynamic noise occurs during engine operation (fuel combustion, valve operation). Noise enters technical cabins in two ways: through metal structures and through air. Cabin equipment itself can also be a source of noise. The contribution of cabin parts to noise generation is as follows: ceiling, rear wall, side wall, front wall and floor [16, 17, 21, 22, 29].

The pressure applied to the engine of the machine affects the noise level. The noise level spreading to the cabs of cars is directly related to the models of agricultural machinery (Table 5).

Table 5

**The level of noise energy in the cabins of different types of equipment**

Models of techniques	Noise energy level db
Z-80	150
Z-82	140
8	50
n-650	5
ng'-850	2
num	00
	5

As can be seen from the above table, the noise energy level at the workplace depends on the level of technical complexity of the engines and equipment cabins. The noise intensity in the cabins of agricultural machinery is estimated on the basis of sanitary standards 0031-94 San TsiM, the noise level is allowed at the workplace. The implementation of noise reduction measures in agricultural machinery is the basis for reducing their negative impact on the body of machinery managers. The technique helps reduce noise by installing a rubber coating between engines and cabs.

In addition, timely maintenance of engines and structures, timely lubrication of necessary parts will help reduce noise. It is very important to conduct a medical examination of drivers of agricultural machinery once a year in the presence of doctors, neurologists, otolaryngologists. In the process of agricultural machinery, vibration affects the mechanization body. Vibration acts on the body of the tractor driver through the seats, control mechanisms (pedal, lever, steering wheel) [15, 16, 20, 21, 25].

Engines and moving parts of the machine create vibrations in agricultural machinery. Moving parts of the equipment mainly generate low-frequency general vibration. As the speed of technology increases and the terrain is uneven, the level of vibration increases [15, 17, 21, 25].

During the operation of agricultural machinery, workers' organs are exposed to low-frequency (2-5 Hz) and high-frequency (60-125 Hz) oscillations [4, 5, 10, 12, 14, 26, 29].



Ensuring vibration safety at the workplace is carried out in accordance with GOST 12.1.012-90.

Treatment and preventive measures to reduce the harmful effects of vibration on the body of workers include:

- Persons under the age of 18 who do not have sufficient experience in managing agricultural machinery and who have not passed the technical minimum and who have not undergone an initial medical examination are not allowed.
- Agricultural workers exposed to vibration during work must undergo a medical examination once a year in accordance with the order of the Ministry of Health of the Republic of July 10, 2012 No. 200.
- Diseases with medical resistance to work under the influence of vibration include:
  - migratory endoarthritis, Raynaud's disease, peripheral nerve angiospasm;
  - chronic diseases of the peripheral nervous system;
- All etiologies of vestibular apparatus dysfunction, including Mener's disease.

For managers of agricultural machinery, it is advisable to create facilities on the farms for outdoor activities, food, and showering.

It is also important to create heated (30-32C) relaxation rooms in autumn, winter and spring seasons.

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