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HYGIENIC BASIS FOR THE HEALTH OF WORKERS IN COTTON PRODUCTION

Khayriddin Olimovich Kasimov

Head of Department of Hygiene No. 1, Bukhara State Medical Institute named after Abu Ali ibn Sino, candidate of medical sciences, associate professor

Summary: The authors of the analysis of the main stages of the effects of cotton provided data on the impact of the main factors of agricultural production on the health status of cotton growers. Hygienic measures were developed to protect the health of workers engaged in cotton growing.

Key words: cotton growing, microclimate, pesticides, dustiness, labor protection.

Relevance of the study: Among agricultural crops, cotton occupies a particularly important place, as it is a valuable raw material for the textile, oil-and-fat, and other branches of industry.

The technological process of cotton cultivation differs significantly from the technologies used for growing cereals and other industrial crops. It consists of several stages: soil preparation; seed treatment and sowing; thinning of seedlings; cultivation; irrigation of plants; topping; control of weeds, pests, and diseases; preparation for harvesting; and mechanized and manual harvesting. Cotton cultivation begins with soil preparation for sowing, including macro- and micro-leveling of cotton fields using graders, levelers, and other machinery, as well as plowing. Cotton is sown using the square-nest method with special seeders mounted on MTZ-80 “Magnum” “ORIEN” tractors. Seed treatment precedes sowing. After emergence, crops are thinned. During the vegetation period (May–July), inter-row cultivation (soil loosening) is carried out 5–6 times. A large proportion of labor input is associated with irrigation, which is performed throughout the entire growing season and ends 2–3 weeks before harvesting.

A significant amount of work in cotton cultivation is devoted to the control of weeds, pests, and diseases. For this purpose, chemical methods are widely used.

From May to August, herbicides, insecticides, and acaricides are applied, while defoliants and desiccants are used in September. The hygienic characteristics associated with pesticide use in cotton farming mainly include the application of a wide range of chemical substances, their simultaneous use over large areas, and the combined effects of chemical and meteorological factors such as high temperatures and solar radiation. The most labor-intensive process in cotton production is the harvesting of raw cotton.

At all stages of the agricultural production process, workers are exposed to physical factors (temperature, humidity, solar radiation), chemical factors (pesticides, mineral fertilizers), and biological factors. In addition, agricultural labor is characterized by high levels of physical strain.

All of the above necessitates the development of hygienic regulations aimed at ensuring occupational safety and protecting the health of workers employed in cotton farming.

This issue became particularly relevant following the issuance of the Decree of the President of the Republic of Uzbekistan dated November 28, 2017, No. UP-3608, “On Measures for the Fundamental Improvement of the Cotton Industry.”

Purpose of the study: To provide a hygienic assessment of the working conditions of employees in cotton-farming enterprises and to develop hygienic regulations for the protection of their health.

Materials and Methods of the Study

The objects of the study were the farming enterprises “Karvon” of the “Bukhtaroy” mahalla committee, “Fayz” of the “Gulistonobod” mahalla committee, and the Shukur-Tukhta farm of the “Sarmijan” mahalla committee in Gijduvan District.

The study was conducted in cooperation with the Gijduvan District Center of the State Sanitary Supervision. Physical workload was assessed using the method of sanitary observation. Air temperature and relative humidity were measured using an aspirated psychrometer (SanPiN RUz 0324-16), air velocity

was determined with a vane anemometer (SanPiN RUz 0324-16), noise and vibration levels were measured using a VShV-003 sound level meter (SanPiN RUz 0325-16), air dustiness was determined by the gravimetric method (guidelines for determining harmful substances in the air), carbon dioxide concentration was measured using an ANT-3 gas analyzer (MU 012-3/0015), and residual pesticide levels in air and soil were determined by thin-layer chromatography (Kyiv, 1985).

Results of the Study

The leading occupations in cotton farming include machine operators, irrigators, crop maintenance workers, and cotton pickers.

The microclimate at workplaces was largely determined by the climatic conditions of the region, as almost all types of work were performed outdoors. The area is characterized by long summers and fairly cold winters, significant fluctuations in air temperature both throughout the year and during the day, and a considerable amount of atmospheric precipitation occurring mainly in the winter–spring period.

The first stage of preparation for cotton sowing was seed treatment. For this purpose, seed treatment was carried out on a specially constructed concrete площадка using the preparations Fitovak and P-4. All workers involved in seed treatment underwent medical examinations and were provided with personal protective equipment.

During soil preparation for sowing, workers were exposed to low and subnormal temperatures (March–April). During the day, air temperature ranged from +4 to +6 °C, relative humidity was 70–95%, and air velocity was 4–6 m/s. Under these conditions, the thermal protective properties of clothing and thermoregulatory capacity were insufficient (according to a survey of 8 workers from each farm).

During the thinning of cotton plants (late April–early May), air temperature in the field ranged from 21 to 34 °C, while in the cabins of MTZ-80 and KhTZ-80 tractors it ranged from 28 to 36 °C. The highest air temperatures were observed during cultivation and summer irrigation of cotton (May–June); at 12:00 and 16:00

the average temperature was 36.4–38.6 °C and periodically reached 41–45 °C.

The effects of high air temperatures during summer work were aggravated by positive thermal radiation from heated metal parts of tractors. During this period, the temperature inside tractor cabins reached 58–59 °C. Relative humidity at workplaces during these operations was 50–60%, and air velocity was 2.5–5 m/s.

All processes associated with soil preparation, cultivation, and uprooting of stalks were accompanied by the formation of a significant amount of dust. During soil preparation for sowing, when harrowing and plowing, dust concentration in the breathing zone of tractor operators ranged from 16 to 21 mg/m³, exceeding permissible limits. During cultivation (MTZ-80 and KhTZ-80 tractors), dust concentration at the workplace was 14–17 mg/m³.

During autumn plowing using a “Magnum” tractor with a four-bottom plow, air dustiness in the tractor cabin was 6–9 mg/m³, while for MTZ-80 and T-4 tractors it averaged 26 mg/m³; during harrowing it reached 38 mg/m³.

During manual harvesting of raw cotton, dust concentration in the air of the working zone, depending on distance from roads and the agrotechnical condition of the fields, averaged 3.2–13.4 mg/m³, which corresponds to the data reported by F.T. Dzhumaev (1987).

During autumn plowing with tractors of various models (MTZ-80, KhTZ-80, T-4), carbon monoxide concentration in the breathing zone of tractor operators when working on the leeward side ranged from 8.4 to 42 mg/m³, and during harrowing from 8.2 to 36.1 mg/m³. No cases of carbon monoxide poisoning were observed among workers operating modern agricultural machinery; however, a number of authors have established that prolonged exposure to relatively low concentrations of carbon monoxide is not harmless. According to F.T. Dzhumaev (1987), the level of carboxyhemoglobin in the blood of cotton machine operators before exposure to carbon monoxide averaged 2.5%, while by the end of the workday it increased to an average of 7.7% in most of the examined workers.

Workers operating tractors used in cotton cultivation were exposed to noise

and whole-body vibration. In the cabins of MTZ-80 and KhTZ-80 tractors, noise intensity reached 109–120 dB.

One of the most responsible and labor-intensive tasks is the work of irrigators. Irrigators were exposed to the full range of climatic factors: low and high temperatures, solar radiation, wind, precipitation, and low or high humidity. During irrigation in the autumn–winter period, irrigators experienced pronounced cooling effects (November–January), with air temperatures ranging from +7 to −9 °C. In the spring period (March), cooling effects were less pronounced; however, water temperature did not exceed 3–6 °C, and air temperature ranged from 4–6 °C in the morning to 18–20 °C during the daytime. Strong winds (up to 16–21 m/s) were frequently observed.

In the summer period, irrigators also worked under unfavorable meteorological conditions. In June–August, air temperature even in the early morning hours reached 30–35 °C, from 12:00 to 16:00 it reached 42–48 °C, and in the evening (19:00–20:00) it remained at 38–39 °C. High air temperature was combined with low humidity and low air movement. During cotton irrigation, workers often performed their tasks while standing in relatively cool water (12–16 °C in June and 18–20 °C in July), while at the same time their head and body were exposed to high temperatures and intense solar radiation. Thus, irrigators exhibited physiological reactions reflecting the effects of multidirectional influences: the head and body were exposed to intense solar radiation and both elevated and reduced temperatures. Irrigators frequently complained of joint pain, burning sensations, and paresthesia in the limbs, especially at night (21 workers were surveyed).

A significant volume of work in cotton cultivation was devoted to the control of weeds, pests, and diseases. For this purpose, from May to August, the preparations “Altin,” “Dalate,” and “Killer” were used in all three studied farms. The preparations were applied using ground-based equipment. Tractor operators and two workers were exposed to these chemical agents. Two hours after treatment, no residual amounts of the preparations were detected in the air,

indicating that the chemicals were unstable in the environment.

In conclusion, workers involved in cotton cultivation are exposed to physical factors (temperature, humidity, air velocity, noise, vibration, solar radiation) and chemical factors (carbon monoxide, pesticides, mineral fertilizers).

Conclusions

Working conditions in cotton farming depend on the level of mechanization of crop cultivation, the applied cultivation technology, and labor organization. To improve working conditions and protect the health of tractor operators, it is necessary to introduce modern agricultural machinery in all cotton-farming enterprises, most of which should meet the requirements of occupational hygiene and ergonomics. To reduce noise levels, tractor cabins used for cotton cultivation should be sealed. To decrease vibration exposure, tractor seats should be adjusted in accordance with the operator's body weight.

To reduce environmental contamination and the harmful effects of pesticides on workers' health, it is advisable to prepare working solutions and mixtures of pesticides and fertilizers at stationary, specially equipped facilities. Workers should be provided with protective clothing and personal protective equipment for skin and eye protection. A more effective measure for protecting the environment from chemical plant protection agents is the transition to biological and agrotechnical methods of pest and disease control in cotton cultivation.

The widespread use of irrigation mechanization is of great importance for improving the working conditions of irrigators. During the cold season, protective clothing should be waterproof, windproof, and insulated. In the summer period, irrigators should be protected from solar radiation and high temperatures by wearing wide-brimmed hats, cotton underwear, and light-colored clothing; the use of special waterproof footwear is mandatory. In field camps, proper nutrition rich in proteins and vitamins should be organized for workers. Compliance with an adequate water–salt balance and the provision of hot tea are essential requirements for cotton workers.

Further improvement of working conditions in cotton farming requires the

organization of comprehensive mechanization of cotton cultivation, as well as automation of technological processes, including sowing control, monitoring the accuracy of machinery movement, and the introduction of drip and sprinkler irrigation systems.

For the prevention and timely detection of diseases among individuals engaged in cotton cultivation, it is advisable to conduct seasonal and periodic medical examinations.

LITERATURES:

1. Морозова Т. В. Оценка нагревающего микроклимата как фактора риска нарушений репродуктивного здоровья у работников в полимерперерабатывающей промышленности //Здоровье населения и среда обитания. – 2018. – №. 11 (308). – С. 50-57.
2. Назарова Г. и др. Социальное, экономическое и экологическое воздействие производства хлопка //Инновационная наука. – 2024. – №. 5-2-1. – С. 105-107.
3. Новикова Т. А. и др. Современное состояние условий труда и оценка профессионального риска здоровью работников мукомольного производства //Анализ риска здоровью. – 2019. – №. 1. – С. 50-57.
4. Панарин В. М., Маслова А. А., Гришаков К. В. Устройство мониторинга физиологических параметров работника во время трудового процесса //Безопасность труда в промышленности. – 2018. – №. 5. – С. 66-70.
5. Петрова Н. Н. и др. Гигиеническая характеристика условий труда работников предприятия деревообрабатывающей промышленности //Гигиена и санитария. – 2017. – Т. 96. – №. 4. – С. 344-346.
6. Рослый А. А. Моделирование воздействия микроклимата на производственные процессы и здоровье работников в мокрых цехах кожевенных производств //Редакционная коллегия. – 2023. – С. 225.
7. Самарина А. А., Кириченко Л. В. Остаточные количества пестицидов в пищевых продуктах растительного происхождения: регламентация,

экспериментальные исследования //Современные проблемы здравоохранения и медицинской статистики. – 2024. – №. 5. – С. 101-122.

8. Сапунова Т. А. Роль организации трудового процесса в управлении предприятием //Экономика и бизнес: теория и практика. – 2021. – №. 10-2. – С. 98-100.
9. Седляров О. И. и др. Анализ и моделирование состояния воздуха рабочей зоны предприятий текстильной и легкой промышленности //Дизайн и технологии. – 2018. – №. 66. – С. 98-104.
10. Сергеев А. К., Белякова Н. С., Кучеренко К. Н. Социально-гигиенические аспекты оценки условий труда и состояния здоровья медицинских работников в Самарской области //Медицина труда и промышленная экология. – 2020. – Т. 60. – №. 11. – С. 863-866.
11. Смагулов Н. К., Хамитов Т. Н. Субъективная оценка условий, напряженности труда и здоровья рабочих листопрокатного производства //Медицина в Кузбассе. – 2018. – №. 1. – С. 50-54.
12. Терешкова Л. П. Курс-на безопасное применение пестицидов //Защита и карантин растений. – 2020. – №. 4. – С. 3-6.
13. Титенок А. В., Амелин А. В., Каценко Е. Н. Производственная пыль //Вестник Брянской государственной сельскохозяйственной академии. – 2020. – №. 4 (80). – С. 62-72.
14. Турсунов З. Р. У. и др. Анализ существующих очистителей хлопковых семян на хлопкоочистительных предприятиях //Universum: технические науки. – 2023. – №. 10-4 (115). – С. 11-17.
15. Abdulkhadi O. Vacuum cleaning system in cotton cleaning field improvement measures //Universum: технические науки. – 2024. – Т. 9. – №. 12 (129). – С. 13-16.
16. Adhikari A. et al. Exposure levels of airborne fungi, bacteria, and antibiotic resistance genes in cotton farms during cotton harvesting and evaluations of N95 respirators against these bioaerosols //Microorganisms. – 2023. – Т. 11. – №. 6. – С. 1561.

17. Ahmad Y. S. et al. Assessment of health and safety risks in a textile industry //Journal of Natural and Applied Sciences Pakistan. – 2020. – Т. 2. – №. 1. – С. 350-369.