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Research Article

INFLUENCE OF SOIL AND CLIMATIC CONDITIONS ON THE OPERATION OF UNIVERSAL PLOUGHING TRACTORS IN AGRICULTURE

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ABSTRACT

The article analyzes the operation of universal mowers in soil and climatic conditions, changes in dust content, air temperature in the regions and cultivation processes, as well as a negative impact on the quality of transmission oil.

KEYWORDS

Tractor, dust, temperature, oil, soil, pressure, corrosion.

INTRODUCTION

The development of the country's agro-industrial complex depends on the level of technical support for agriculture, the development and introduction of high-efficiency machines, and the use of technology. At each of these stages, a reliable comprehensive assessment is necessary to manage the processes of development, research, production, and operation of machines. That is, the Republic of Uzbekistan is a cotton-growing country, where agricultural machinery has to

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work in difficult soil-climatic conditions, characterized by high temperature and dustiness of the air, which is associated with intensive wear of the machine [1-4].

Currently, in the agricultural sector of our Republic, more than 30 thousand TTZ and MTZ models (TTZ-60, TTZ-80 and MTZ-80, MTZ-82) are used for planting, applying mineral fertilizers, inter-row processing and harvesting. being used in harvesting operations [5-11].

In the Republic of Uzbekistan, the operation of these tractors is carried out in difficult working conditions. The climate of our republic is sharply continental. In the republic, in the summer season, the air temperature raises sharply, the amount of precipitation decreases, and intensive evaporation is observed. The highest extreme temperatures are observed in June and July (Table 1) [12-19].

Table 1. Average daily air temperature by region in the Republic of Uzbekistan

Provinces	*Temperature ℃*	
	the hottest month	the hottest five-day period
Andijan	34.6	38.0
Bukhara	37.0	41.0
Kashkadarya	38.6	42.0
in Samarkand	35.0	39.0
Surkhandarya	38.8	42.5
Syr Darya	35.0	38.7
Tashkent	34.3	38.6
Ferghana	35.1	38.5
Khorezm	34.0	37.7
Karakalpakstan	35.4	40.2

Table 1 shows that the highest daily air temperature is observed in the Surkhandarya region. An increase in air temperature leads to deterioration of the physicochemical properties of transmission oil, in particular, a decrease in kinematic viscosity and an acceleration of corrosion of the friction parts by mixing with dust particles that enter the gearbox from the outside and are formed internally due to mechanical impurities [20-27]. The pressure inside the gearbox increases, which causes the gaskets to fail. The values of the average relative humidity of the air in the regions of the Republic of Uzbekistan are presented in Table 2 [28-35].

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Table 2, annual by region in the Republic of Uzbekistan average relative humidity of the air

Provinces	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*
Tashkent	70	67	63	56	47	38	34	36	45	69	72	73
Syr Darya	90	84	76	72	64	61	59	64	67	78	85	89
Jizzakh	78	74	63	56	45	36	43	44	45	66	77	88
in Samarkand	75	73	60	53	41	33	38	38	41	61	73	81
Ferghana	82	72	57	55	49	46	45	51	52	66	79	84
Andijan	86	79	66	59	54	47	48	58	65	72	83	87
Namangan	79	69	54	43	38	43	50	51	69	65	74	84
Kashkadarya	74	72	57	50	40	36	34	35	46	53	72	81
Surkhandarya	75	67	54	41	32	30	29	34	39	54	71	79
Bukhara	77	69	56	39	32	31	30	33	37	56	73	80
Navoi	80	71	59	45	42	38	35	45	47	58	75	79
Khorezm	70	79	55	45	40	38	37	44	46	60	77	78
Karakalpakstan	77	68	54	44	42	38	39	45	48	59	78	79

In the republic, the indicators of relative air humidity vary from 30 to 90 per cent throughout the year. The lowest relative humidity is observed in May-September [36-42]. That's why it's universally popular in these months tractors work in dry and dusty weather. In the agricultural conditions of our republic, the increase in loading of universal wheeled tractors also corresponds to the months of May-September (Table 3).

The operation of universal tractors in conditions with high dust content in the air, as mentioned above, leads to severe contamination of the transmission oil with abrasive particles through the tightness of the box. According to NVMikhailovsky, the amount of dust at the level of air permeability during cotton cultivation and harvesting has the following values. [43-49]:

Table 3. Air dust content during cotton cultivation and harvesting

Operation	*Amount of dust in the air, g/m2*
Planting	1.1-1.65
Cultivation	1.2-1.35
Chemical treatment	0.75-1.0

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Fabric: Cotton	2.85-3.25
Shovel	1.7-2.0
Cotton stalk	0.75-1.0

As can be seen from Table 3, the increase in airborne dust is dominated by planting, cotton and harvesting.

The composition of atmospheric dust in the form of clouds formed only under the influence of wind (at a wind speed of 5.2-6.7 m/s, at a temperature of 32-34 ℃) is presented in Table 4 [3].

Table 4. Cloud dust composition

Height of measurement point, m	Dust content, g/m3
0.50.91.82.2	1.5-1.60.9-1.00.6-0.70.3-0.4

The study of the mineralogical and dispersion composition of grey soil dust clouds showed that they contain 65-70% silicon oxide, as well as about 10% aluminium oxide and 5% iron oxide. About 95% of these particles are up to 50 μm and about 5% are up to 100 μm. The average dispersed content of dust is in the range of 20-40 microns [45-52].

It can be seen that the most abrasive particle in the dust is silicon oxide. The hardness of these particles exceeds the hardness of the abrasive particles resulting from the friction of the friction parts of the gearbox, which is the main reason for the rapid failure of the parts.

CONCLUSION

In conclusion, it can be said that the rise of dust, high air temperature, and dry climatic conditions during the operation of universal crawler tractors lead to contamination of the gearbox oil. As a result, there is an increase in the rate of consumption and a state of rapid failure. The main problem is the lack of oil filters in the gearbox lubrication system of universal tractors. This indicates the need for scientific research to solve the problems in this system.

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