OPTIMIZATION OF THE THERMAL STATE OF THE ENGINE BASED ON THE USE OF EXTERNAL LIQUID COOLING OF THE RADIATOR

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Annotation. The climate of Central Asia is characterized by poor precipitation, most of which falls in winter and spring. The reserves of moisture created during this time in the soil are depleted at the beginning of summer. In winter, the weather is unstable, rainy, often cold. The winter period ends in the flat regions of Central Asia at the end of February or the beginning of March.

The climate of Central Asia is characterized by a sharp predominance of winter precipitation over summer. During three winter months, up to 40% of the annual amount of precipitation falls by the end of April in the regions of Koga and the center of Central Asia, the amount of precipitation sharply decreases. In most of the three summer months, precipitation barely reaches 1.2% of the total annual precipitation. A sharp decrease in the amount of precipitation by summer is accompanied by an increase in temperature and very intensive evaporation of moisture. Самая высокая температура, которая наблюдалась в г Термезе +50°С.Впустынной зоне абсолютные максимумы температуры обуславливают очень низкую влажность воздуха, в различных районах Средней Азии она снижается до 17% и ниже[1]. Большинство районов Средней Азии расположено в пизовьях речных бассейнов Туранской низменности, лишеной как поверхностного, так и подземного водного стока. Грунтовые воды минерализуются за счет солей, приносимых из верхних частей доли. Твердость почвы зависит от ее влажности, плотности, механического состава и является косвенным показателем удельного сопротивления почвы. К этому следует добавить, что в условиях сухого жаркого климата земледелие, как правило, ПОЛИнное. В каждый полив существенно уплотняет почву увеличивая удельное сопротивление движение трактора, один полив увеличивая удельное сопротивление почвы в среднем на 10% С производственной точки зрения, трение представляет собой вредное явление, т. е Приводит к увеличение энергоемкости полевых работ, что а свою очередь, приводит к повышение температурной напряженности двигателя трактора. Повышение температурной напряженности двигателя при использования очень жесткой воды для системы охлаждения, способствует интенсивному накипеобразование.The engine cooling system must provide the optimal temperature regime for its operation - the coolant temperature is 75-95 "C, the oil temperature is not more than 90 ° C and the minimum power consumption for driving the cooling system units.It is known that cleaning the cooling system in the radiator tubes from the products of corrosion-scale formations is extremely difficult, since it contains up to 90% or more of iron oxide, which practically does not dissolve in the solutions recommended by the literature for

descaling[2]. Therefore, the fight against corrosion-scale formation this is primarily a struggle to prevent its formation. The recommended chemical means to prevent the formation of scale are sufficient, one for various reasons - scarcity, toxicity, high cost, etc. They are not used.We propose a different approach to solving this problem. Scale formation is the release of Ca and Mg salts from water. The intensity of this process depends on the water temperature. The higher the temperature of the water, there this process is intense. Especially intense scale deposits begin at a water temperature of 85°C. From this it follows that the optimization of the thermal state of the engine and ensuring the temperature of the coolant within 70 ... 80 "C will significantly reduce the process of scale formation. For these purposes, we have chosen the method of external liquid cooling of the radiator[3].

The object of the study was the MTZ 80XS tractor with an engine and a radiator operating for 1.5 years. During the providence of experimental studies, the water temperature was recorded during the operation of the tractor on the 1st cotton cultivation after irrigation when moving on 1, II, III, gear in 2 mutually opposite directions.The measurements were carried out with and without forced external liquid cooling of the radiator, with steady movements and a steady water temperature.The air temperature during the studies was +35°C, the number of clogged radiator tubes was 11 pcs. or 6.7% of their total number. Such a number of radiator tubes are clogged with an operating time of 300-350 moto. hours.The effect of external liquid cooling of the radiator of the engine cooling system is that water has a large heat capacity, and spraying water on the radiator can relieve a significant heat load[4].From the results of experimental studies, it can be seen that the water temperature in the cooling system stabilizes at a value of 82-83 "C, when processing the 1st cultivation, and when processing after irrigation, the water temperature in the cooling system stabilizes at 110-112 ° C. When using an external liquid cooling of the tractor at a value of 70°C and 72°C, respectively, i.e. the proposed device helps to reduce the water temperature in the engine cooling system to 20-30°C.Studies have shown that the maximum efficiency of engines is achieved at a coolant temperature of 70-75 ° C, namely, at coolant temperatures above 80 ° C, salts of CA and Mg containing in water begin to differ with the release of precipitation of calcium carbonates CACO3, magnesium hydroxide Mg (OH)2, carbon dioxide and water.Therefore, while ensuring the optimal thermal state of the engine 70-75°C, optimal performance of the engine is provided and conditions are provided to minimize the formation of scale[5].

Conclusions: 1. The increase in soil density after irrigation has a significant effect on the thermal state of the engine. As a result, the coolant temperature increases by 10...14°C.

2. An external liquid-cooled radiator keeps the engine in an optimal thermal state of 70-75°C, which minimizes scale formation.

3. The recommended water consumption is 5l/hour, i.e. side volume for external cooling of the radiator is 40l. When using cotton ash for this system, a radiator from external pollutants is achieved.

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