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## **COMPARISON OF TRADITIONAL AND ELECTRIC AGRICULTURAL MACHINERY**

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## **COMPARISON OF TRADITIONAL AND ELECTRIC AGRICULTURAL MACHINERY**

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Agriculture has always been one of the most important sectors of human activity, providing food, raw materials, and economic stability, and according to research on agricultural development [6], technological progress has significantly influenced farming practices, especially through the development of agricultural machinery. Today, farmers can choose between traditional machinery, which typically relies on internal combustion engines, and modern electric agricultural machines, making their comparison highly relevant in the context of sustainable development and innovation.

Traditional agricultural machinery has been widely used for decades and, as highlighted in FAO publications [5], these machines usually operate on diesel or gasoline engines and are known for their high power and reliability. Tractors, combines, and harvesters powered by internal combustion engines are capable of handling large-scale farming operations efficiently, while their ability to work for long hours without frequent refueling makes them especially practical.

However, traditional agricultural machines also have significant drawbacks, since their environmental impact is considerable and, as noted in international reports [1], they emit greenhouse gases that contribute to climate change. Moreover, rising fuel costs increase operational expenses, and noise pollution and vibrations can negatively affect both operators and the environment.

Electric agricultural machinery is a relatively new development but is rapidly gaining popularity, and scientific research in this field [2] shows that these machines are powered by electric motors and batteries instead of fossil fuels. One of the key advantages of electric machinery is its environmental friendliness, as it produces zero direct emissions and significantly reduces noise levels.

Another important benefit of electric agricultural machines is their lower operating costs, because studies on agricultural automation technologies [3] indicate that they require less maintenance due to having fewer moving parts. There is no need for oil changes, and electricity can often be cheaper than traditional fuel, especially when renewable energy sources are used.

Despite these advantages, electric agricultural machinery also faces several challenges, as discussed in recent studies [2], particularly regarding battery capacity and charging

infrastructure. Electric machines may have shorter operating times and require recharging, which can interrupt work during critical farming periods.

In conclusion, both traditional and electric agricultural machinery have their strengths and weaknesses, and research on sustainable agriculture [4] suggests that while traditional machines remain dominant, electric machinery represents the future due to its environmental benefits. As technology improves, electric agricultural machines are likely to become more widespread and play a key role in sustainable farming.

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