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# How to improve fuel efficiency by applying correct mechanisation practices

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**M**echanisation is the major component of crop production but is also becoming very costly due to the price increase of farm machinery and diesel fuel. It is therefore important to utilize farm mechanization systems efficiently and thus save fuel costs when doing farming operations. Some crucial factors are to be discussed in this article to improve fuel efficiency.

## **Mechanisation maintenance**

Proper maintenance of tractors and equipment is especially important to be able to optimize fuel consumption. Timely replacement of air and fuel filters can reduce

fuel consumption and increase engine power. Changing oil regularly and greasing moving parts according to maintenance plan will also increase tractor efficiency and obtain a prolonged life span.

Timely maintenance and repairing of planters and implements will increase field efficiency and reduce total cost inputs. Well-maintained tractors and implements will minimize breakages and save time and money.

## **Tractor to implement matching**

Using a large tractor for light loads is inefficient. It is important to utilize the



Field test for matching tractor and implement

## Field SFC vs wheel slip @ constant engine power

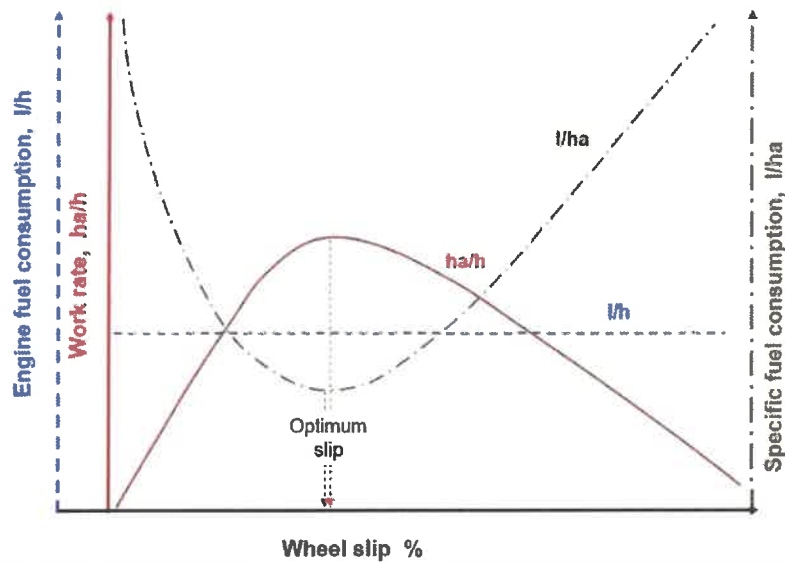


Figure 1. Common relationship of implement work rate, wheel slip, total and specific fuel consumption

optimum engine capacity of the tractor because tractors are priced by engine capacities (R/kW). Using a too small tractor for operations that need more engine power is also inefficient because engine overloading and too much wheel slip can lead to higher fuel consumption.

The graphs in Figure 1 reveal the relationship among the major parameters influencing the fuel efficiency.

Indicated by the graphs above, the implement will be perfectly matched to the tractor when the specific fuel consumption in l/ha is at its lowest point and the work rate in ha/hour is at its highest point which will be on the best wheel slip point as well. The graph also shows that wheel slip is necessary for efficient traction although too much wheel slip will increase fuel consumption and decrease the work rate.

### Selection of the operating speed

The correct operating speed selection is important to optimize fuel consumption. Every operation has an optimum speed to work on. The higher the speed, the higher the engine load. The engine-specific fuel consumption is at its lowest when operating the engine at close to maximum power. Too fast operation speed may lead to engine overloading

and inefficient operation results. Too slow operation speed may lead to underutilization of engine power or excessive wheel slip. Gearing up and throttling back can lead to fuel savings. Make sure not to overload the engine, excessive black smoke indicates overloading.

### Ballasting tractors correctly

Properly ballasted tractors with recommended tire inflation rates can improve fuel consumption and increase traction efficiency by creating the required amount of wheel slippage for the specific implement and field conditions.

A certain amount of wheel slip is necessary to create good traction. The average necessary wheel slip percentage on soft terrain is between 10 and 15% but may vary according to the field conditions and working speeds.

### Optimizing the field efficiency

Field efficiency refers to the time the operation takes versus the turning and other non-productive time. Spending too much time turning around at short fields or overlapping tillage operations within a field can result in higher fuel consumption. Planning road travel trips as optimised can also save fuel.

### Precision agricultural practices

Energy and therefore a big fuel saving can be

achieved by using global positioning guidance systems such as auto-steer with a planting operation or any other soil preparation activities.

Site-specific farming using equipment guidance, yield monitoring systems, field mapping, and applications for precision crop inputs can provide many economic and environmental benefits in addition to energy savings.

It is therefore important to make use of precision agriculture technologies to save costs on many aspects of the farming practices, which also includes the extremely expensive fuel cost.

### **Fuel storage**

Proper fuel storage can save fuel before it goes into the tractor. Keeping above-ground fuel storage tanks shaded and painting them a light colour can reduce the loss of fuel via evaporation caused by heat from environmental circumstances.

### **Biodiesel**

If you produce crops for biodiesel production like sunflower or soybeans, and you have the knowledge and equipment to produce biofuel, please take the opportunity to save money by using biofuel.

### **Solar power**

Using solar power by using solar-powered pumps instead of diesel engine-driven water pumps will also reduce your diesel costs on the farm.

Solar power systems can be considered to replace diesel generators for electricity supply to reduce fuel costs and hence the total cost.

### **Conclusion**

Many practices and techniques can assist a farmer in saving fuel costs if one keeps mind and eyes open. Big save on fuel can be achieved through the effort of analysing and optimising farming practices, especially mechanisation practices whenever it is possible and economically viable to do so.

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