

OPTIMISING MECHANISED TECHNOLOGY IN WHAT IN THE CONDITIONS OF BAZOȘ, TIMIȘ COUNTY, ROMANIA

Anișoara DUMA COPCEA, Casiana MIHUȚ, O. ARSENE

*Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania"
from Timișoara, Romania*

Corresponding author: e-mail: duma_anisoara@yahoo.com

Abstract: *Advanced, performing agriculture from the perspective of yield and labour productivity in different countries is based on an important technical and economic segment: mechanisation of soil works. Equipping modern sustainable agriculture according to peak country expertise in the field is done with machines and equipment among which energy equipment are of great economic importance and efficacy. For Romania, with its great agricultural potential per capita and with favourable soil and climate conditions, it is important to increase labour productivity by increasing the degree of mechanisation on agricultural holdings. Straw cereals cover an important area in Romania, with wheat ranking first among crops. From a cropping science point of view, wheat cultivation is completely mechanised. Studies were carried out in the conditions specific to the Timis Plain and they concerned wheat, the crop with the widest cultivation area in the Banat's Plain. The mechanised works in wheat were stubble-turning, ploughing, fertilising, preparing the germination bed, sowing, treating with herbicides and harvesting. These works were done with modern tractors and agricultural machines of high productivity. In mechanised works in wheat we determined the following technical and economic indices: productivity of agricultural aggregates, fuel consumption, direct costs, auxiliary costs, material costs and profit. These indices were reported in the technological charts of mechanised works. Studies allowed us to draw a few conclusions on the optimisation of mechanisation in wheat. The system of agricultural production is represented by the manner in which an enterpriser combines products, factors, and technological and economic measures at hand to practice crop rotation and reach desired economic outcomes. Choosing crops and cultivars, carrying out works in due time and of high quality, carefully monitoring the evolution of its components, ensuring optimum density in plants per ha, all this depend on skills, aptitudes, creativeness and inventiveness of the managers of agricultural holdings. For Romania, a country with a huge agricultural potential (arable land per capita and favourable climate conditions), it is important to increase labour productivity by increasing the degree of mechanisation of agricultural holdings.*

Key words: *wheat, crop, harvesting combine, threshing, grain loss, yield.*

INTRODUCTION

Due to its high ecological plasticity, wheat can be cultivated in different climate areas and at high altitudes; from a crop science point of view, wheat cropping is entirely mechanised and wheat is part of almost all crop rotations since it is a good pre-emergent crop: its vegetation is relatively short, which favours optimum conditions for the preparation of the germination bed of the following crop(s).

Choosing the aggregates is also done depending on direct exploitation costs. If two aggregates need, from the point of view of costs, the same production costs, then we need to choose the one that meets the requirements of the machine system. Agricultural aggregates consume large amounts of energy, which asks for the establishment on scientific grounds of constructive and exploitation parameters with minimum energy consumption.

Tractors are the energy source of aggregates. They are part of all agricultural aggregates, being essential in mechanisation.

Worldwide, tractor manufacturing companies tend to modernise tractors and, implicitly, reduce fuel consumption.

MATERIAL AND METODS

The present studies concern the optimisation of mechanisation technology in wheat. Measurements were made at Bazos, Timis County, Romania. Mechanised works were done with agricultural aggregates from the S.C. Bazoş SRL.

The area cultivated with wheat was 600 ha. Mean yield upon wheat harvesting was 6,000 kg/ha. Material costs represent the value of fertilisers, seeds, herbicides, etc. Material costs are calculated in RON/ha and are presented in Table 1 below.

Table 1.

Material costs in wheat

Material	Amount (MU/ha)	Value (RON/ha)
Wheat seeds	240 kg/ha	360
Complex fertilisers (12:52:0)	200 kg/ha	400
Granulated urea (46% N)	200 kg/ha	380
Nitrogen (33% N)	120 kg/ha	140
Herbicides (tribenuron-methyl 250 g/kg)	40 g/ha	30
Fungicides (FALCON 460EC)	0.7 l/ha	125
Insecticides (Biscaya 240 OD)	0.2 l/ha	40
Foliar fertiliser (Filloton)	2 l/ha	50
TOTAL		1,525

To apply performing technology in wheat, we developed agricultural aggregates equipped with GPS allowing precise mechanised works such as:

Stubble-turning:

- Tractor CASE IH MAGNUM 310 + disc-harrow STROM PRECISER PE 6000.

Ploughing:

- Tractor FENDT FAVORIT 924 + plough LemkenVariopal 9/5+1;
- Tractor NEW HOLLAND TM190 + plough KVERNELAND LB 85/4+1.

Fertilising (three applications):

- Tractor CASE IH MAXXUM 140 + machine KVERNELAND EXACTA HD.

Preparing the germination bed:

- Tractor FENDT FAVORIT 926 + disc-harrow AGROMASZ;
- Tractor FENDT FAVORIT 924 + coulter-harrow Kuhn.

Sowing straw cereals:

- Tractor CASE IH MAGNUM 310 + sowing machine Kverneland Accord MSC 6000;

- Tractor FENDT FAVORIT 924 + sowing machine KVERNELAND ACCORD DA.

Herbicides + foliar fertilisation (two applications):

- self-propelled machine AGRIFAC CEBECO;
- Tractor CASE IH MAXXUM 140 + machine KVERNELAND RAU IKARUS 3800L.

Harvesting:

- Combine CASE IH 7130 + HEDER DE PĂIOASE;

- COMBINA NEW HOLLAND CX 6080.

RESULTS AND DISCUSSIONS

In each mechanised work, we determined the following technological and economic indices: hourly and daily productivity, fuel consumption per ha, wage costs, fuel costs, aggregate maintenance costs, reduction in value, direct costs, auxiliary costs, and total cost. The value of mechanised works in wheat expressed in RON/ha are presented in Table 2 below.

Table 2.

Value of mechanised works in wheat

Mechanised work	Value (RON/ha)
Stubble-turning	86
Ploughing	175
Fertilising (three applications)	51
Preparing the germination bed	48
Herbicides and foliar fertilisation	32
Sowing	56
Harvesting wheat	144
Transport cereals	38
TOTAL	630

CONCLUSIONS

Studies carried out allowed us to draw the following conclusions and make the following recommendations:

- Total costs of mechanised works in wheat were 630 RON/ha. If we add to the total value of mechanised works the value of materials necessary to cultivate wheat (1,525 RON/ha), the total value of costs per ha was 2,155 RON/ha.
- Taking into account that mean yield in wheat was 6,000 kg/ha and that the price of wheat was 0.60 RON/kg, the value of yield was 3,600 RON/ha. Thus, profit per ha was 1,445 lei, i.e. 40% of the mean yield per ha of wheat.
- The main factors influencing wheat yield in 2015 were crop rotation, the quality of agricultural works, climate conditions, sowing time, and ensuring nutrients.
- Doing mechanised works at the proper time and with a normal soil moisture level has a huge impact on yield because well-aerated soil with no clods allows sprouting and proper development of the plants.
- The quantity of nutrients applied as chemical fertilisers is necessary to ensure normal development of wheat plants; a high supply of nitrogen in the soil allows vigorous development in the plants, but with no other macro- and micro-elements there is unbalance, which affects the growth and development of the plants and decrease of productivity.
- To produce large amounts of wheat in the climate conditions specific to the Timis Plain we recommend the choice of proper cultivars adapted to the soil and climate conditions in the area.

- High yields per ha with low costs need strict observance of cultivation technologies by using complex agricultural aggregates of high productivity.

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