STUDIES REGARDING GRAIN LOSS IN STRAW CEREALS

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Abstract:*Harvesting straw cereals is the most important mechanised work in July. To cut the losses to a minimum, harvesting with self-propelled combines is done upon full ripening. To cut the losses, fields should not be weeded or have fallen plants and combines should be fixed depending on the field state. In weeded fields, harvesting is done by cutting plants with wind-rovers, letting them dry and harvesting with lifting equipment attached to the combines. To avoid loss during harvesting, we need to choses the plots to be harvested depending on the ripening state of the crops. It is recommended to cultivate several cultivars with different ripening periods to reach maximum harvesting time. These last years, there has been spectacular evolution in self-propelled straw harvesting combines, which now are highly performing from the point of view of productivity, reliability, automation, the quality of the harvested crop and comfort in operating.mTo determine properly losses upon harvesting straw cereals, we need to evaluate yield before harvesting. Upon harvesting, we need to determine losses and to take measures to reduce them through properly fixing straw harvesting combines. The main losses in harvesting straw cereals depend on field state, on the flow of the thresher, on combine tightness, on self-propelled combine fixtures, etc. Losses are determined for each case apart and are presented quantitatively and as percentage depending on the yield evaluated. Using straw harvesting combines with a feeding flow above optimum causes higher losses. Optimum feeding flow is established depending on the type of the harvesting combine and on the field state, so that grain losses range within admitted limits.Using straw cereal harvesting combines rationally at the optimum time ensures minimum loss and low expenses.*

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

INTRODUCTION

Equipping agriculture with straw cereal self-propelled combines was necessary to harvest larger and larger agricultural areas in a shorter time and with a minimum of labour.

The introduction of self-propelled combines caused a significant cut of the number of labourers in agriculture and their shifting towards other social activities.

Harvesting the crops means completing the process of agricultural production.

Since it depends directly on natural conditions and, particularly, on climate factors that vary largely in time and space, organising labour needs to permanently adapt to these conditions.

Organising straw cereal harvesting can shorten the harvesting time and increase labour productivity.

To reach these objectives and to rationally exploit the combines, we need to take organisational measures among which preparing the field for harvesting, choosing the way the combines will move in the field, and ensuring the transport of the main crop.

Harvesting straw cereals is extremely important and it needs to be done in due time and with minimum loss.

The dynamics of equipping agriculture with mechanic implements is steadily increasing: current focus is on increasing the number of agricultural machines and equipment and on their improvement.

Equipping agriculture with modern implements needs proper training and a high level of professionalism of those operating them.

Maintaining combines in a proper technical state that ensures their normal functioning is the main condition for a proper harvesting campaign.

MATERIAL AND METODS

Trials were carried out in four wheat fields measuring 240 ha at Petroman, Timis County, Romania.

The wheat cultivar used was Lovrin 32. Upon harvesting, we used two self-propelled combines: ClaasLexion 600 (Figure 1) and John Deere W 650 (Figure 2).

Figure 1. ClaasLexion 600 combine

Figure 2. John Deere W 650 combine

Evaluating wheat yield was done upon full ripening.

We evaluated the yield of a field of 60 ha choosing five determining points along the plot diagonal.

The wheat cultivar chosen was Lovrin 32.

Results of the evaluation are presented in Table 1 below. Mean yield was 4,646 kg/ha.

Table 1.

Evaluation of wheat yield in the wheat cultivar Lovrin 32

Number of sample	Number of spikes per m^2	Mean number of grains per spike	Volume of thousand grains (g)	Yield (kg/ha)
1	310	34	38	4005
2	320	35	38	4256
3	346	37	38	4864
4	362	36	38	4952
5	357	38	38	5155
Mean	**339**	**36**	**38**	**4646**

RESULTS AND DISSCUSION

The factors that determined grain loss upon harvesting wheat at Petroman, Timis County, Romania, were:

– grain loss depending on field state;
– grain loss caused by moisture;
– grain loss on stubble at the header;
– grain loss from spikes not threshed;
– grain loss on stubble.

Monitoring the two combines at work, we determined grain loss upon harvesting.

These losses were calculated per combine and we calculated the mean for each case apart.

Total grain loss in kg/ha for a yield evaluated at 4.646 kg/ha are presented in Table 2 below.

Table 2.

Grain losses upon wheat harvesting

Type of grain loss	Losses (kg/ha)	Percentage of estimated yield
Grain loss depending on field state	107	2.30%
Grain loss caused by moisture	47	1.01%
Grain loss at the header	87	1.88%
Grain loss from spikes not threshed	5	0.11%
Grain loss on stubble	43	0.92%
Total losses	**289**	**6.22%**

CONCLUSIONS

Research allows us to draw the following conclusions and to make the following recommendations:

Measurements regarding grain loss upon wheat harvesting are confirmed by yield.

Thus, upon harvesting the wheat cultivar Lovrin 32 from 240 ha, the crop reached an average of 4,350 kg/ha, i.e. 93.63% from the estimated yield of 4,646 kg/ha.

This means that real loss upon harvesting was of 296 kg/ha, i.e. 6.367%.

Taking into account that wheat price was 0.65 RON/kg, the loss values was:

$$296 \text{ kg/ha} \times 0.65 \text{ RON/kg} = 192 \text{ RON/ha}.$$

Loss value over the entire area cultivated with wheat was:

$$192 \text{ RON/ha} \times 240 \text{ ha} = 46{,}080 \text{ RON}.$$

The value of the wheat yield per was:

$$4{,}350 \text{ kg/ha} \times 0.65 = 2{,}827 \text{ RON/ha}.$$

The value of the grain yield harvested from the harvested area was:

$$2{,}827 \text{ RON/ha} \times 240 \text{ ha} = 678{,}480 \text{ RON}.$$

In percentage, the total value of the losses from the harvested area was 6.79%.

To rationally exploit the combines, we need to repair and check the combines before harvesting to make sure they operate without flaws during the harvest.

Yield loss above admitted limits are in the combines that are not properly maintained because separation is not properly done, which increases grain loss and chaff loss.

If harvesting is don below optimum flow, energy consumption increases; if it is done above optimum flow, yield loss increases.

To avoid grain loss, we need to monitor the functioning of the combines in the field, to sample to determine losses, to establish the loss causes and to remediate flaws.

At the end of each work day, we need to make the necessary maintenance operations and feed the combine with fuel.

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