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INTER-RELATION BETWEEN SOME CHARACTERISTICS OF CORN CROPS AND STEEP LAND

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Abstract. In our paper we wish to describe the relationship between several characteristics of corn crops and steep land. Important characteristics have been are taken into consideration, i.e. the weight of the fully grown plant, stubble height, corn crop height and weed growth. The results are given in the form of a graph. The increasing slope of land has a negative influence on the weight of a plant, 10mm stubble height and corn crop height.

Keywords: steep land, crop, distances

INTRODUCTION

The future development of animal husbandry is relative to the sufficient feed base. Feed production is a basic branch of vegetable production. Fodder crops are grown on over 50% of agricultural land. Fodder crops are an important area and a factor of vegetable production as well as an important condition for animal husbandry because they produce from 66% to 75% of the foodstuffs necessary for domestic ruminant animals [1,2]. Corn is a basic yearly fodder crop. Corn predominates in supplying the fodder crop base with its fertility. The main advantage in growing corn is the fact that it can be stored in a silo and is highly productive. For the production of silo crops there are many factors. This article deals with one of them.

MATERIAL AND METHODS

The aim of this work is to show the interdependence between the sloping land of a soil site and biological crops, the height of the crop, the level of weed growth and weight of 10 mm-stubble. Experimental measurements were realised in the Košice Fold on hills with slopes of 0°, to 5°, to 10° and over 10°. Individual samples from selected plots were picked using the hand harvest method. All told, 270÷300 sample measurements were gathered. Samples were taken on the day before the harvest or on harvest day. The weights of the samples were weighed to an accuracy of 0,02 kg. The yield was collected during the phase of waxy maturity corn. Assuming that the same agro technique, level of protection and subsistence would be kept, the samples were evaluated and statistically prepared determining the values as x – the arithmetical average, s – the standard deviation.

OWN INVESTIGATIONS

The inter-relation between steep land and several observed parameters of the corn crop are the following.

The weight of the fully grown plant: measurement of 17 plant samples from an area $1m^2$ was realised on harvest day using the hand harvest method. Individual plants, which were in the same spacing, were cut off close to the soil surface. Statistically prepared data is illustrated in figure 1. The result of this measurement is that where steep land increases in gradient the weight of the corn plant decreases.

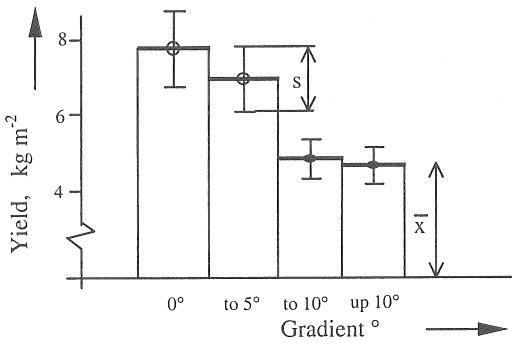

Fig. 1. Inter-dependence of the weight of mature plants and land gradient. x is the arithmetical average, s is the standard deviation

Determining the height of 10mm-stubble was realised after the corn crop had been cut over an area of $1m^2$, the samples being taken from various places of the gathered corn crop. There are 300 samples extra for every slope. The samples

taken were cut to a height of10 mm and then weighed. This measurement was used in order to determine the following losses, which come into existence if a given cutting height is not maintained [3,4]. The results are illustrated in figure 2, and show that the sample weight decreases where the gradient of a slope increases.

Corn crop height was measured with a zigzag rule with an accuracy of 1 mm. All 390 plants were measured at various places of the corn crop on all sloping land.Plant height was measured from the soil surface to the tops of the plants. The results are illustrated in figure 3. and show that plant height decreases if the gradient of the slope increases.

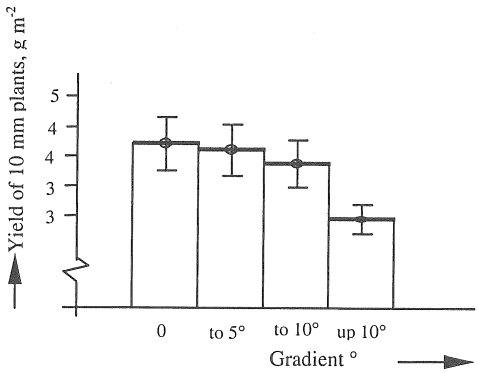

Fig. 2. Illustration of the weight of 10 mm cut-offs

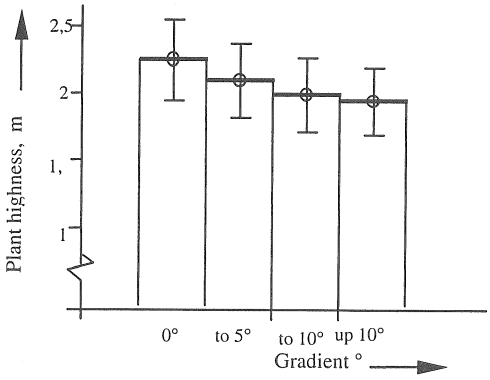

Fig.3. Illustration of plant height in relation to the gradient

Weed growth – The level of weed growth was determined using the following equation:

$$\eta = \frac{G_b}{G_b + G_k} \cdot 100\% \qquad (1)$$

where *Gb* is the weight of weed in g m^{-2}, G_k – is the weight of corn in g m^{-2}.

Evaluation by means of this equation showed that the level of weed growth on lowland areas was $\eta \sim 0{,}08\%$, on hilly areas to 5° was $\eta = 0{,}17\%$, on hilly areas to 10° was $\eta = 2{,}26\%$ and on hilly areas over 10° was $\eta = 2{,}5\%$. The above mentioned measurements show that weed growth increases where the gradient of a slope also increases.

At the same time, we also evaluated the yield per hectare from individual sites, regardless of which machinery had gathered the crop. This data also supported the fact that if steep land increases then yield also decreases. The yield

from lowland areas was 69,1 t ha^{-1}, on hilly land to 5° the yield was 57,8 t ha^{-1}, on hilly land to 10° the yield was 42,3 t ha^{-1} and on hilly areas over 10° the yield was 37,2 t ha^{-1}. By comparing this data to figure 1, it is evident that losses, which appear during the crop harvest of silo corn, are great and result in large amounts of stubble, which exist because the given height requirements had not been adhered to.

CONCLUSIONS

1. The harvest of silo corn is influenced by many factors among them being variety, the level of protection and the level of food, soil site, corn harvesting machinery, climatic conditions etc.

2. In this work, it has been demonstrated that besides these factors, the harvest is also influenced by the gradient of the land. This is illustrated in figure 1. The gradient of the soil site also influences crop height, figure 3, stalk weight of 10 mm stubble, figure 2 and levels of weed growth.

REFERENCES

1. **Belej J.:** Kukurica, Príroda, Bratislava, 1982.
2. **Baranič F. A.:** Zásady silážovania krmovín. In.: Metódy zavádzania výsledkov výskumu do praxe, No.7, 1982.
3. **Swoboda A., Vaska Z., Swoboda jr. A.:** Vplyv nedodržania výšky strniska pri zbere silážnej kukurice na výšku zberových strát. Mechanizace zemédélství, No. 5, Praha, ČR, 1991.
4. **Swoboda A., Jech J., Siany J.:** Žacie stoly zberových strojov Teória, konštrukcia, riziká. Vinala a.s. Košice, SR, 2000.

ZWIĄZEK POMIĘDZY NIEKTÓRYMI CECHAMI PLONU KUKURYDZY A SKŁONEM TERENU UPRAWY

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Streszczenie. Autorzy opisują w pracy zależność pomiędzy kilkoma cechami plonu kukurydzy a skłonem terenu uprawy. Przeanalizowano takie ważne charakterystyki, jak: masę całkowitą roślin, wysokość roślin, masę ziarna i masę chwastów. Wyniki przedstawiono w formie graficznej. Wzrost skłonu terenu ma negatywny wpływ na masę całkowitą roślin, masę roślin ścinanych na wysokości 10 cm i masę ziarna.

Słowa kluczowe: skłon terenu uprawy, plon, odległości