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**The influence of some technological elements on sunflower yields,
cultivated in the Timis Low Plain**

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Abstract: Due to the outstanding biological qualities and the versatility of the oil obtained both for human consumption and for industrial and energy uses, in recent years, the national and international demand for sunflower seed production has become increasingly high, which has led Romanian farmers to include the cultivation of this species in their different crop rotations, year after year. Against a backdrop of favorable climatic and soil conditions, sunflower has become a traditional crop in Romania, as demonstrated by the dynamic of the areas and yields obtained in the last decade, which have consecutively placed our country at the top of the European and even world rankings. At the same time, this particular species also has a remarkable fodder value in terms of the secondary products obtained after processing the seeds, namely sunflower grit and sunflower cakes, which are used in various fodder recipes, for several animal species such as sheep, goats and cattle. It is not to be neglected either that this crop is of particular importance for honey production in our country. For these reasons, it is necessary to constantly improve and adapt the cultivation technology of this valuable species to the current economic and environmental challenges, in order to ensure the same high level of this crop's productivity. In this present paper, through research carried out over three experimental years (2022, 2023 and 2024), it was monitored the behaviour of two sunflower hybrids, adapted and cultivated in the pedo-climatic conditions of the Timiș Low Plain, an area recognized for its favourable results in sunflower seed production, both due to the high natural fertility of the soils and the sufficient water supply from rainfall. At the same time, the impact on production of some technological element essential for cultivation was observed, namely the chemical fertilization carried out on two distinct levels.

• Introduction

With multiple uses, sunflower (*Helianthus annus L.*) is a particular species of the botanical family Asteraceae, native to the American continent, known and appreciated, primarily as an oil plant, due to the superior quality of the oil extracted from the achenes, but also for its color, taste and pleasant odor, in addition to its high content in vitamins (A, D, E, K) and minerals.

Because of its special properties and the versatility of the oil obtained (for human consumption, biofuel production or for different industries), the demand for sunflower cultivation is increasingly high, both nationally, as well as at European and even international level, which is the main reason for more and more Romanian farmers to include, year after year, the cultivation of this species in their crop rotation.

In addition to the utility of the oil, there are also other parts of the plant, from which, two secondary products are obtained after oil extraction: sunflower grit and sunflower cakes, well-known in animal nutrition. They are high in protein, minerals (phosphorus, iron, copper) and vitamins (B-complex) and can be used as part of the feed for several animal species.

The calathidiums remaining after harvesting are also not to be neglected, as they are a valuable source of feed, especially for sheep.

In recent years, thanks to the financial support offered to young people through the access to European funds for beekeeping, sunflowers have also become increasingly appreciated as a honey plant.

• Material and method

For the research carried out in the period **2022-2024**, in the **Timiș Low Plain Romania**, two sunflower hybrids were used as genetic materials, one of which is P64LE137, an early hybrid and Subaru HTS, which is semi-late one, recommended to be cultivated in all lowland areas, both in natural and irrigated conditions.

The experience carried out was a bifactorial one, in which:

Factor A – the cultivated hybrid

a₁ – P64LE137 developed by Pioneer company

a₂ – Subaru HTS developed by Syngenta company

Factor B – The fertilization level

b₁ – N15P15K15 = 300 kg/ha + 10 kg sulphur

-fertilizer based on nitrogen, calcium and magnesium = 250 kg/ha

-foliar fertilizer Lebosol bor – 2 l/ha

b₂ – N15P15K15 = 250 kg/ha + 10 kg sulphur

-fertilizer based on nitrogen, calcium and magnesium = 300 kg/ha

-foliar fertilizer Lebosol bor – 2 l/ha

• Results and discussions

The research carried out in the three experimental years, respectively 2022, 2023 and 2024, on a weakly gleyed chernozem soil type with a medium texture in the first 50 cm and high fertility, shows a different behaviour of the two cultivated hybrids, in relation to the fertilization applied.

Cultivated hybrid	Fertilization level	Achenes production kg/ha	Difference production compared to the control variant kg/ha	% compared to the field average
PT64LE137	Level 1 N15P15K15 = 300 kg/ha + 10 kg sulphur fertilizer based on nitrogen, calcium and magnesium = 250 kg/ha foliar fertilizer Lebosol boron – 2 l/ha	3917	+125	103,29
	Level 2 N15P15K15 = 250 kg/ha + 10 kg sulphur fertilizer based on nitrogen, calcium and magnesium = 300 kg/ha foliar fertilizer Lebosol boron – 2 l/ha	3757	-35	99,07
Average production of the hybrid		3837	+45	101,18
Subaro HTS	Level 1 N15P15K15 = 300 kg/ha + 10 kg sulphur fertilizer based on nitrogen, calcium and magnesium = 250 kg/ha foliar fertilizer Lebosol boron – 2 l/ha	3802	+10	100,26
	Level 2 N15P15K15 = 250 kg/ha + 10 kg sulphur fertilizer based on nitrogen, calcium and magnesium = 300 kg/ha foliar fertilizer Lebosol boron – 2 l/ha	3689	-103	97,28
Average production of the hybrid		3746	-46	98,78
Average production of the cultivated variants kg/ha		3792	Control variant	100

The average yield of the two hybrids cultivated in the three experimental years, on two fertilization levels, under the pedoclimatic conditions of the researched period, was of 3792 kg/ha.

Although the overall yield achieved, under the cultivated conditions mentioned above, is not at the value of the genetic potential of the analyzed hybrids, these sunflower varieties have still proved to be profitable for the Timiș Low Plain farmers.

• Conclusions

Of the two hybrids studied during the reference period, the Pioneer PT64LE137 hybrid showed better tolerance to climatic stress factors during the vegetation season.

The higher yield potential of this genetic material, coupled with an additional amount of fertilizer (50 kg of phosphorus and potassium, administered in variant 1), resulted in the higher yield.

In the years with climatic conditions close to normal, with the application of suitable technology (with a focus on the fertilization plan) and considering the production potential of these hybrids, sunflower grain yields in the Timiș Low Plain can be very high, making this crop one of the most profitables for the farmers of the area.