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**MECHANIZATION TECHNOLOGIES FOR ALFALFA IN THE PECIU NOU AREA**

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**Abstract:** *The main goal of the work is to evaluate and streamline the technological flow of mechanization for alfalfa cultivation in the Peciou Nou area. The aim is to identify the most suitable equipment configurations that ensure high yield, maintain the nutritional quality of the forage and reduce operational costs (fuel and labor) in the specific soil and climate conditions of the Timiș Plain. The objectives of the study are: analysis of local conditions: - evaluation of the influence of soil type (predominantly chernozem) on the seedbed preparation works; optimization of the set of machines: - selection of optimal machines for sowing, maintenance and, especially, for staged harvesting (mowing, turning, gathering, baling); loss reduction: - minimization of plant mass losses (especially leaves) by correctly choosing the timing and working speed of the machines; energy efficiency: monitoring diesel consumption per unit of finished product. The study was carried out on a farm in Peciou Nou, using an experimental area cultivated with a variety of alfalfa adapted to the western area.*

• **Introduction**

Alfalfa (*Medicago sativa*) occupies a privileged position within sustainable agricultural systems, being considered by (MUNTEAN, L.S., ET.AL., 2011) as the most valuable fodder plant due to its ecological plasticity and the superior quality of the fodder obtained. In the western part of Romania, and especially in the area of Peciou Nou, the cultivation of lucerne finds particularly favorable pedoclimatic conditions, the chernozem soils providing the necessary nutritional support to achieve the maximum biological potential of the species.

• **Material and method**

- The studies in this paper were carried out under the specific conditions of the Timiș Plain, belonging to the large geographical unit Banat Plain.
- The territory studied belongs to the Peciou Nou locality, Timiș County, being representative of the Timiș Plain.
- The study refers to the alfalfa crop. The area cultivated with alfalfa was 5 ha. The preceding plant was oats. The perennial alfalfa crop was harvested for a period of 4 years, from 2021 to 2025.
- The mechanized works on the 5 hectares cultivated with alfalfa were carried out with the agricultural aggregates from the farm where the study was conducted. Each year, 4 scythes were harvested from the respective area. The harvest was gathered in the form of bales.

• **Results and discussions**

- For the alfalfa crop, the soil nutrition strategy included two distinct stages, designed to ensure the necessary nutrients throughout the entire life cycle of the plant:
- Basic fertilization
- It was carried out by applying complex NPK fertilizers (12:37:0), using a dose of 250 kg/ha.
- Phase fertilization (during vegetation): ammonium nitrate (with a concentration of 33.5% N) was administered, in a quantity of 150 kg/ha.
- From a chronological point of view, the technological scheme included a single basic intervention, followed by three successive applications during the vegetation period, corresponding to the II, III and IV years of production

• **Conclusions**

- Rising labor costs have reached the threshold of parity in the risk ratio between 2021 and 2025.
- A production of 8 tons/ha is now the minimum threshold for economic survival. Below this amount, at current fertilizer costs, the crop may become unprofitable.
- Compliance with technology is no longer just a recommendation for high production, but a necessity for survival.
- The use of high-yield aggregates (large working widths, GPS, high-density balers) is the only way to reduce labor and diesel costs per hectare. Bale twine and netting, although previously negligible, now represent a cost component that must be monitored, with price increases correlated with petroleum products.