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„ The influence of sowing and harvesting techniques on operational and economic indicators of maize silage cultivation ”

Abstract

The subject of the dissertation was the cultivation of maize for silage. Two technological operations, namely sowing of seeds and harvesting of green mass, were considered as really important. Research problem formulated in the form of the following two issues, namely the range to which corn variety and sowing density affect the development of plants during the growing season and yield at harvest, the range to which technical parameters in technology affect the values of operational and economic use of techniques and technologies of harvesting corn intended for silage. The scope of research included laboratory and field tests of maize sowing and exploitative testing of silage maize harvest. Laboratory and field tests included ten maize varieties (FAO 220 to FAO 260), seed sowing at five distances: 6.4; 12.7; 18; 24 and 36 cm, assumption of field experiments using the split-plot method (number of varieties 10, number of combinations 6, number of belts 2). Operational tests included the characterization of the farm in terms of equipment in basic buildings, tractors, machines, production means, production and organization. Two sets of machines were assessed in detail (farm A and B) for which the values of basic parameters and operational and economic indices were determined. In the evaluation of the course and discuss the results of research carried out calculations emergence of plants in the plots, measurements of plant height and seat height flask (three weeks after flowering), yield fresh weight, percentage of dry matter. Studies was completed with a statistical analysis, which showed no significant interaction of the varietal factor with the seed spacing in the row, which means that each variant reacted similarly to the change in the spacing. The simple regression analysis in the assessment of the relationship between the seed spacing in the row and the fresh mass yield is linear, while the dry matter yield was constant at $22 \text{ t}\cdot\text{ha}^{-1}$. Operational tests concerned a detailed questionnaire related to farm equipment in: buildings, tractors, machinery, production means and agricultural production as well as sets of machines used in the technological operation of silage maize harvesting. Two sets of machines were selected based on the Kuhn MC 908

TWIN tractor harvester and the Claas Jaguar 930 self-propelled forage harvester with the appropriate means of transport. The compared harvesting technologies based on these machines were characterized by the following features:

- in the agrotechnical season, 400 hours of machine operation, the area available for harvesting maize is A 360 ha in technology B 1080 ha,
- total prices of all machines used in technology A- amount to 850,000 PLN, in technology B- PLN 950 thousand PLN,
- hourly fuel consumption differs significantly technologies (technology A - $18.22 \text{ dm}^3 \cdot \text{h}^{-1}$ technology B - $59.8 \text{ dm}^3 \cdot \text{h}^{-1}$), while unit fuel consumption is similar (technology A - $29.02 \text{ dm}^3 \cdot \text{ha}^{-1}$, technology B - $26.85 \text{ dm}^3 \cdot \text{ha}^{-1}$),
- hourly operating costs of sets differ significantly and for technology A they amount to PLN $194.66 \cdot \text{h}^{-1}$, while for technology B - PLN $457.39 \cdot \text{h}^{-1}$,
- unit operating costs of sets are higher for technology A and amount to PLN $334.23 \cdot \text{ha}^{-1}$ and lower for technology B - PLN $218.31 \cdot \text{ha}^{-1}$.

Summarizing, it should be stated that the range of tractors and silage maize harvesting machines offered to the agriculture meets the basic requirements of agricultural producers. The trends of machine improvement in the aspect of automation and robotization promise a reduction in the cost of technological operations, improved service safety, and meeting ecological requirements.