

Natalia Matłok

**Agricultural, energy and economic aspects of the use of waste biomass
from the nursery production**

Streszczenie:

The Podkarpackie Voivodeship is one of the largest nursery centers in Poland and Europe dealing with the production of fruit trees and shrubs. The production of fruit-growing nursery material in the area in recent years shows an upward trend and in 2016 there was over 20 million seedlings of fruit trees [WIORiN, 2017]. The problem of waste biomass generated in the production of fruit trees during the clogging of the attached rootstocks is an important issue, so there is always a need for utilization or disposal of waste in accordance with applicable legal acts.

The purpose of this doctoral dissertation was to develop a balance of the amount obtained waste biomass from nursery production in the Podkarpackie voivodship in the years 2005-2015, as well as the evaluation of its chemical composition in terms of determining the possible directions of its utilization. In the years 2014-2016, precise micro field experiment was carried out regarding the use of waste biomass chips from the production of fruit trees as an organic fertilizer in the fertilization of nursery plants. In the two-year production cycle of apple-tree maiden trees on vegetative rootstocks M9, four doses of wood chips (0, 2, 3 and 5 t • ha⁻¹) were tested based on the minimum, average and maximum amount of biomass obtained after the picking of rootstocks from 1 ha. The impact of the applied doses of waste biomass in comparison to the control on the number of receptions of planted apple rootstocks and budding shields, as well as the number of selected maiden trees I and II were determined. Soil from individual variants of the experiment was subjected to laboratory analyzes in order to determine the impact of the biomass chips applied on the change of their/its physical and chemical properties. The cost-absorbing and energy consumption analysis were carried out in the production of nursery planting material depending on the method of waste biomass management.

Based on the laboratory tests concerning the chemical composition of waste biomass obtained from 13 species of tree fruit rootstocks, it was found that the obtained waste biomass could be used as fertilizer for the production of one-year old fruit trees. In the analyzed waste biomass from nursery production, the presence of micro and macroelements desirable from the point of view of the growth and development of plants was observed, which can be a

source of nutrients in the production process. What is more,, no heavy metals such as lead (Pb) and arsenic (As) were detected. Plot experiments carried out with waste biomass showed a positive effect on the quantity and the quality of the nursery material produced, as well as the soil environment. In addition, the utilization of waste biomass as a fertilizer in the production of fruit trees has contributed to the reduction of financial outlays and energy consumption in the production of apple trees as compared to the currently used technology, consisting of the export and combustion of the obtained biomass. The proposed technology of waste biomass management as fertilizer increased the profitability of nursery production, while maintaining the quality of tree fruit trees produced up to date.