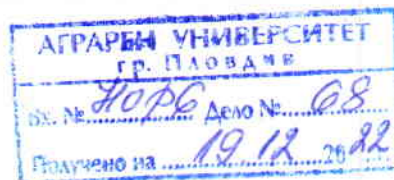


OPINION



on doctoral dissertation for receiving the educational and scientific degree of “**Doctor**” in area of higher education: 6. *Agrarian sciences and veterinary medicine*, professional field: 6.1 Horticulture, scientific specialty: Horticulture

Author of the doctoral dissertation: Hristina Atanasova Nedeva

a self-study doctoral student at the Department of Horticulture, Agricultural University of Plovdiv

Topic of the doctoral dissertation: Effect of nitrogen fertilization and harvest timing on productivity and quality of triticale green biomass used for energy purposes

Reviewer: Prof. Dr. Dragomir Gospodinov Valchev, Institute of Agriculture, Karnobat, area of higher education: 6. Agrarian sciences and veterinary medicine; professional field: 6.1. Horticulture; scientific specialty: Breeding and seed production of cultivated plants, appointed as a member of the scientific jury with Order No RD-16-1100/27.10.2022 by the Rector of the Agricultural University.

1. Relevance of the problem.

Biomass is one of the main sources of renewable energy. Woody and agricultural biomass are unprocessed wood, plant crops, agricultural residues, wood waste. With the application of biomass in energy production increases the possibilities for energy independence and reduction of greenhouse gas emissions. The doctoral dissertation investigates a relevant scientific problem related to the search for ways to increase the quantity and quality of the production obtained from two Bulgarian triticale cultivars for biogas production.

2. Aim, tasks, hypotheses and research methods.

The aim of this study was to determine the effect of applying different nitrogen fertilizer rates and harvest phases on the yield and quality of triticale green mass intended for biogas production. To realize this goal were set five well-formulated tasks to perform, which fully correspond to the direction of the study. The tasks were related to investigating the effect of different nitrogen fertilization rates and harvesting phases on the growth and development of triticale grown for green mass; studying the effect of different nitrogen fertilization rates and harvesting phases on physiological indicators of triticale grown for green mass; establishing the effect of different nitrogen fertilization rates and harvesting phases on the structural elements forming the green biomass; studying the effect of different nitrogen fertilization rates and harvesting phases on the yield of green biomass; establishing the effect of different nitrogen fertilization rates and harvesting phases on the quality of the obtained production intended for biofuel. A field experiment of significant scale was conducted. Precise biometric measurements were reported, the

quality of the obtained production was determined. All studies were performed by means of classical methods. To process statistically the reported experimental data was used the analysis of variance method, using Biostat, SPSS for windows, v 9.00; Duncan's Multiple Range Test.

3. Visualization and presentation of the obtained results.

The doctoral dissertation is well structured, contains all the required sections and covers a total of 171 pages. The doctoral dissertation contains very good visual aids, namely 49 tables and 6 figures. The data interpretation corresponds with the set tasks and obtained results.

4. Discussion of results and used literature.

The obtained results are analyzed skillfully and thoroughly. The language and style of the presented doctoral dissertation is scholarly, concise and contemporary. The effect of various factors on the quantity and quality of the yield of the studied triticale cultivars intended for biofuel was established. The effect of nitrogen fertilization and harvesting phases on some physiological indicators related to the productivity of triticale for green mass was established. The extensive, thematically arranged literature review includes 231 authors, of which 80 in Cyrillic and 151 in Latin scripts, and shows that the doctoral student is well informed regarding this problem.

5. Contributions of the doctoral dissertation.

The results from the study are summarized in 15 conclusions, which cover the scope of the study and prove the successful performance of the set tasks. The more important scientific and applied science contributions in the doctoral dissertation are:

Scientific contributions

1. Varietal differences were determined in the phenological development of the tested triticale cultivars, Musala and Atila, grown for green mass. The duration and the necessary temperature sum for the interphase periods and their growing period under different weather conditions during the years of research were determined for the conditions of Plovdiv region.
2. The physiological properties were established for Attila and Musala triticale cultivars grown for green mass in the Plovdiv region and their changes as affected by nitrogen fertilization and harvesting phases.
3. Cultivar Atila was found to be superior to Musala in nitrogen assimilation efficiency, energy efficiency, obtaining higher yields with nitrogen input consumption of 1 kg.
4. The chemical composition and the yield of the biomass nutrients were determined for the tested cultivars as well as the impact of nitrogen fertilization on them.
5. Theoretical calculations were made for the yields of silage, biogas and methane for the selected variants of the two triticale cultivars, Musala and Atila.

Applied science contributions

1. The genotypic specificity of two modern Bulgarian triticale cultivars was established for the level of nitrogen fertilization and the phases of harvesting green mass under the conditions of Central South Bulgaria.
2. It was established that heavy rainfall during the ear emergence period accompanied by strong winds result in the Musala cultivar showing a lower resistance to lodging compared to the Atila cultivar.
3. It was proven that the cultivar more suitable in terms of green mass yield in drier years for the region of Central South Bulgaria is Musala.
4. A stable tendency was observed where green and dry mass yields increase when nitrogen fertilizer rates are applied. The highest yields are obtained when triticale cultivars are fertilized with a nitrogen rate of 20 kg/day. Using a high nitrogen rate of 24 kg/day does not positively affect yields.
5. Changing weather conditions were established to cause a varietal response regarding the green mass quality. The more pronounced effect of nitrogen fertilization on the quality of triticale green mass compared to the cultivar impact was confirmed.

6. Critical notes and questions.

I have no noteworthy critical notes and questions.

7. Published articles and citations.

Three scientific articles in English were published in relation with this dissertation. Hristina Nedeva is the first author in two of them and single author of the third. In compliance with the NACID requirements, she is awarded 50 points for them. No citations were reported.

The submitted 41-page dissertation abstract objectively reflects the structure and content of the doctoral dissertation.

CONCLUSION:

On the basis of the various methods of research learned and applied by the doctoral student, the correctly conducted experiments, the summaries and conclusions made, I consider that the presented doctoral dissertation meets the requirements of the Development of Academic Staff in the Republic of Bulgaria Act and the regulations of the Agricultural University for its application, which gives me reason to evaluate it **FAVOURABLY**.

I allow myself to suggest that the honourable Scientific Jury also vote favourably and award Hristina Atanasova Nedeva the educational and scientific degree of “**Doctor**” in scientific specialty Horticulture.

Подписите в този документ са заличени

Date: 14.12.2022
Karnobat

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(Общ Регламент относно защитата на данни).