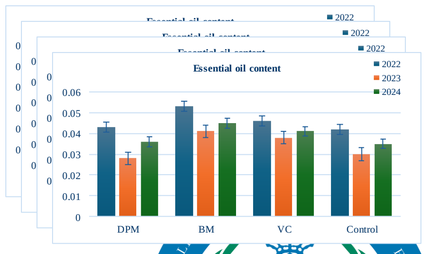

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AGRICULTURAL PERFORMANCE OF OIL-BEARING ROSE UNDER ORGANIC FERTILIZATION

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Abstract: Scientists today are focusing on new agricultural practices to enhance the yield and quality of medicinal plants. The products derived from these plants are valuable raw materials for the pharmaceutical and cosmetic industries, and ensuring their organic origin is a top priority. The use of organic farming practices corresponds to the objectives of the Green Deal and helps to provoke the natural fertility of the soil. In a dynamically changing climate, proper and appropriate fertilisation contributes to the better adaptation and development of crops. This study aims to examine whether different organic fertilizers affect the productivity and quality of essential oil in Damask rose. The experiment was conducted using a randomized complete block design with three replications for three years. The following organic fertilizers were utilized: dried poultry manure Polynamatura NP, bone meal OrgaNexport N:P 10:8, and vermicompost Biohumus, each applied at their respective doses. Results showed that fertilization with these organic products significantly increased the productive potential and the quality of oil-bearing roses. Among the fertilizers, bone meal had the most positive impact on productivity and essential oil yield. The highest essential oil quality was obtained from the variants treated with bone meal and vermicompost, and they could be recommended for sustainable rose production.

• Introduction

The production and processing of oil-bearing roses in Bulgaria is based on tradition and dates back 300 years (Todorova et al., 2020). The genus *Rosa* unites more than 200 species, but only a few representatives are used because of the high quality of their essential oils (Kovacheva et al., 2010). Rosa Damascena is undoubtedly the brightest representative of the family, which is grown on the most considerable areas (Kovacheva et al., 2010). Its essential oil is an expensive and high-quality natural product with unique properties (Cebi et al., 2021). The essential oil contains more than 300 different constituents, whose amount and composition can vary widely depending on the cultivar, ecotype, climate conditions, and production technology (Toluei et al., 2019). In aromatic herbs, the plant nutrition affects the aroma profile and the active substances composition (Pandey and Patra, 2015). Recognizing the plant nutrition system is crucial for attaining high quantity and quality yields in both agronomic and horticultural crops (Hamedi et al., 2022a). In organic farming systems, biological additives and fertilizers are important sources of plant nutrients, which can improve the overall performance of the crop by increasing the productivity and quality of the production (Hamedi et al., 2022a). Research that provides information on the application of organic products on the productivity and quality of oil is scarce (Samani et al., 2021). In this regard, the study of organic rose-growing systems requires scientific support to achieve the goal of sustainable agriculture. The current research work aims to compare the effectiveness of three organic fertilisers on the productivity of Damasc rose and the quality of its essential oil.

• Material and method

The experiment was set in the region of the Rose Valley of Bulgaria, on five-year-old Damascena rose plantations. The study was arranged according to the randomized complete block design in three replications for the period 2022-2024. Each experimental plot had an area of 18 m2 and covered two rows with 21 rose plants. The following fertilizers have been included in the experimental setup: dried poultry manure (DPM) Polynamatura NP (organic nitrogen 2%; P205 2.5%, K2O 2%; MgO 2%, CaO 12%; B 0.004%, Mn 0.04%; Zn 0.02%, organic carbon 20%) in a dose of 60 kg ha-1; bone meal (BM) OrgaNexport N:P 10:8 (meal from bones, horns and hooves, organic nitrogen 10%, organic carbon 40%, P205 8%) in a dose of 50 kg ha-1, vermicompost (VC) Biohumus (organic manure 50-60%, organic carbon 35%, organic nitrogen 3%, P205 2.2%, K2O 1.2%, CaO 8.31%) applied in a dose of 1l per bush. All variants were compared to an unfertilized control. The products were applied in autumn before the last tillage.

• Results and discussions

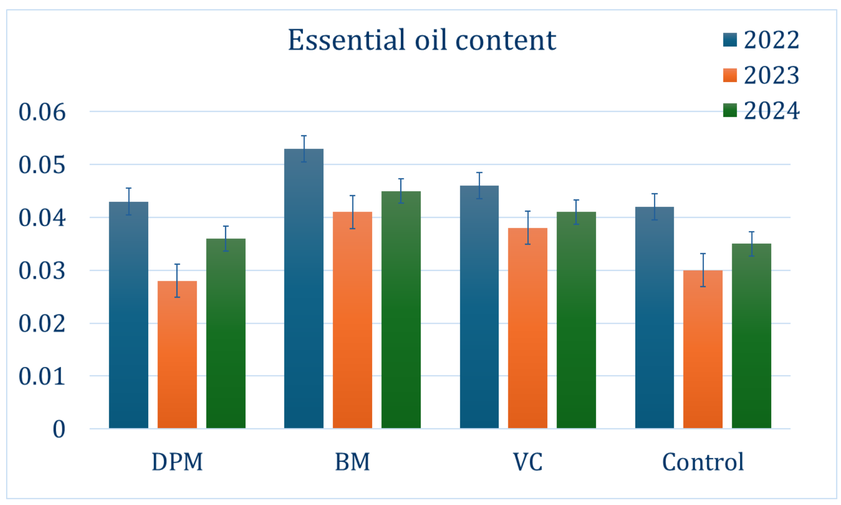

Figure 1. Content of essential oil (%).

Table 1. Yield of fresh flowers (kg ha^{-1}).

Variants/Years	Flower yield, kg ha^{-1}		
	2022	2023	2024
1. DPM	4536^{b}	2912^{a}	3745^{b}
2. BM	4830^{c}	3024^{b}	3850^{b}
3. VC	4662^{b}	3080^{c}	3990^{c}
6. Control	4200^{a}	2800^{a}	3500^{a}
LSD 5%	245	128	187

*Values with the same letters do not differ significantly.

• Conclusions

During the test period, the yields of rose flower and essential oil changed under the influence of both the applied organic fertilization and the climatic conditions. Fertilization with bone meal contributed to an increase in the average yields of rose flower by up to 15%. As a result of the same treatment, a maximum content of essential oil in the rose flower of 0.053% was also recorded.The application of bone meal and vermicompost increases the % of monoterpene alcohols in the oil, which respectively increases the quality of the raw material.The results obtained allow bone meal to be recommended for the needs of organic and sustainable rose production.