

DOI 10.36074/grail-of-science.17.03.2023.025

THE EFFECT OF *MALVA SYLVESTRIS* L. PLANT DENSITY ON ITS PRODUCTIVITY

Panchenko Kateryna Stepanivna 

PhD student

*Poltava State Agrarian University, Ukraine*Pospelov Serhii Viktorovich 

Doctor of Agricultural Sciences, Professor, Head of V.I. Sazanov

Department of Agriculture and Agrochemistry

Poltava State Agrarian University, Ukraine

Species of the *Malva* L. family have long been known as technical, fodder, medicinal, food and decorative plants [1]. Annual small-flowered mallows are highly productive, cold-resistant, plastic crops [4]. The medicinal properties of mallow have been established, which is explained by its diverse chemical composition [1, 5-7]. According to phytochemical analysis, plants contain terpenoids, namely: sesquiterpenes, diterpenes, and monoterpenes; coumarins, flavonoids, malvin, malvidin 3-(6-malonylglycoside)-5-glucoside, malvone A (2-methyl-3-methoxy-5,6-dihydroxy-1,4-naphthoquinone) malvaline, scopoletin, polyphenols, niacin, folic acid, vitamins A, C, E, and tannins. The plant has antioxidant, anti-inflammatory, anti-cancer, wound-healing, hepatoprotective and antimicrobial effects [5-7].

Mallow is introduced into culture mainly as a fodder, technical, food and medicinal plant. Mallow flowers are mainly used for the production of herbal teas and medicinal herbal collections. For this, buds, flowers and young leaves of plants are collected [1]. It is impractical to collect raw materials in nature, therefore there is a need to grow mallow and improve the technology of its cultivation [2, 3]

The purpose of our research was to determine the effect of mallow placement schemes on its productivity. The research was conducted during 2019–2021 in the Botanical Garden of the Poltava V.G. Korolenko National Pedagogical University. In the experimental research, the seeds of the forest mallow (*Malva sylvestris* L.) were used, which were sown in open ground in the spring, and after obtaining seedlings, the studied variants were formed according to the experiment scheme. The productivity of flowers was studied in six research options according to plant density: 1 – 45 x 10 cm; 2 – 45 x 20 cm; 3 – 45 x 30 cm; 4 – 60 x 10 cm; 5 – 60 x 20 cm; 6 – 60 x 30 cm.

Such a variety of options allowed us to study in more detail the effect of nutrition area on its productivity. There is not a significant amount of information on this subject, so this is a relevant topic for study.

Figure 1 shows the results of the study of the effect of the plant density on the number of flowers on the plant. The analysis of data by year shows that in 2019, the

largest number of flowers was formed, and the maximum number reached 295 pcs. per plant on the option of placing plants 60 x 10 cm. In 2020, in which the least amount of precipitation fell during the growing season, fewer flowers were on the plant, especially on variants with a row width of 45 cm, which indicates that mallow is demanding on the soil moisture regime.

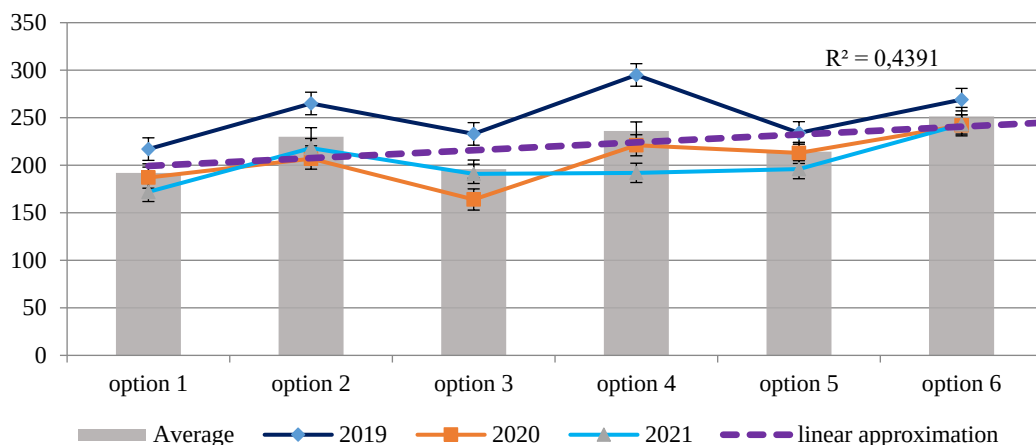


Fig. 1. The number of flowers on a plant (pieces) depends on plant density

On average, over the years of research, more flower formation was observed on the 45 x 20 cm, 60 x 10 cm and 60 x 30 cm options - 230 - 251 pcs. per plant. At the same time, a linear dependence of the number of flowers on a plant on the area of nutrition, which has a coefficient of determination $R^2 = 0,439$, was observed.

We found an even more pronounced dependence on plant density when we examined the productivity of plants by the mass of flowers (Fig. 2). According to the years of research, the productivity was the lowest in 2020 and the maximum in 2019. Under the conditions of plants placement with row spacing of 45 cm, their productivity was lower than placement with row spacing of 60 cm (29.8-39.5 g and 40.3-49.3 g, respectively). As indicated in Figure 2, there was a high correlation (coefficient of determination $R^2 = 0.730$) between plant productivity and nutrition area.

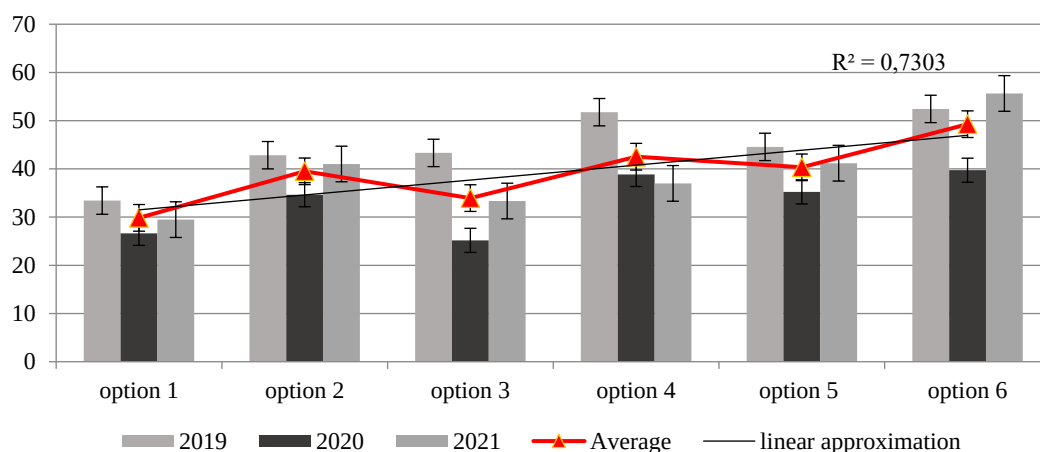


Fig. 2. Productivity of plants by mass of flowers (g) depending on plant density

From the above research results, we can conclude that plant placement schemes have an effect on mallow productivity. The most effective cultivation method was 60 cm row spacing and 30 cm distance between plants, which must be taken into account when creating mallow agrocenoses.

References:

- [1] Likarski roslyny: Entsiklopedychnyi dovidnyk (1991). Vidp. red. A. M. Hrodzinskyi. K.: Holov. red. URE. 543 s.
- [2] Panchenko, K.S. (2020). Ahrobiolohichni osoblyvosti predstavnykiv rodu malva (Malva L.) Likarske roslynnytstvo: vid dosvidu mynuloho do novitnikh tekhnolohii: materialy vosmoi Mizhnarodnoi naukovo–praktychnoi konferentsii. Poltava.: RVV PDAA. S.77-78. <http://doi.org/10.5281/zenodo.4054586>.
- [3] Pospelov, S. V., Opara, M. M., Panchenko, K. S., Zdor, V. M. & Solop, V. Ya. (2021). Posivni yakosti nasinnia likarskykh roslyn zalezno vid yikh stratyfikatsii. Visnyk PDAA. № 1. 156–162. <http://doi.org/10.31210/visnyk2021.01.19>.
- [4] Rakhmetov, D.B. (1999). Yntroduktsiya y selektsiya kormovykh rastenyi semeistva Malvovykh (Malvacea) v Lesostepy Ukrainy. Introduktsiia roslyn. 1999. No 2. S.25-31.
- [5] Azab, A. (2017). Malva: Food, medicine and chemistry. European Chemical Bulletin, 6(7): 295. <https://doi.org/10.17628/ecb.2017.6.295-320>.
- [6] Bao, L., Bao, X., Li, P., Wang, X., & Ao, W. (2018). Chemical profiling of Malva verticillata L. by UPLC-Q-TOF-MS E and their antioxidant activity in vitro. Journal of Pharmaceutical and Biomedical Analysis, 150. 420–426. <https://doi.org/10.1016/j.jpba.2017.12.044>.
- [7] Dipak, Paul (2016). A review on biological activities of Common Mallow (Malva sylvestris L.). Innovare Journal of Life Sciences. 2016. No 5, V 4. 1-53.