The effect of selected agronomic factors on growth, yielding and chemical composition of *Stevia rebaudiana* Bert.

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STRESZCZENIE W JĘZYKU ANGIELSKIM

Today's society is struggling with many lifestyle diseases that are caused by a sedentary lifestyle and improper nutrition. Excessive sugar consumption, widespread in the so-called first world countries, is one of the key causes of the increasing incidence of obesity, diabetes and insulin resistance among people. These diseases are also appearing in younger people than in the past. Increasing the availability of sweeteners that could be a substitute for sugar may reduce the consumption of simple sugars. The plant raw material stevia derived from the *Stevia rebaudiana* Bert. plant, unlike synthetic sweeteners, may find greater acceptance in the average consumer's diet, as most people prefer natural products. Stevia, apart from its sweet taste, contains many vitamins, minerals and bioactive substances with health-promoting properties that are not present in artificial sweeteners. Cultivation of stevia in Poland could potentially reduce the price of these plants and sweeteners produced from them due to lower production and transport costs, as currently the largest stevia crops are in South America and China. However, it is a tropical plant, therefore it may not be suitable for cultivation in the temperate climate of Poland. Currently, due to ongoing climate change, the average temperature in Poland is constantly increasing, which may be important for the cultivation of stevia in the future.

As part of the doctoral dissertation entitled "The effect of selected agronomic factors on growth, yielding and chemical composition of *Stevia rebaudiana* Bert." the possibility of growing stevia (*Stevia rebaudiana* Bert.) in the temperate climate of Poland was assessed, using selected agrotechnical treatments in order to optimize the cultivation technology and obtain a large, good-quality crop. In three field experiments, conducted in 2014-2016, the impact of fertilization was analyzed using different doses of nitrogen introduced pre-vegetation and top dressing (0+50 kg N·ha^{-1}, 50+50 kg N·ha^{-1}, 100+50 kg N·ha^{-1}, 150+50 kg N·ha^{-1}) and forms of nitrogen fertilizers in pre-vegetation fertilization (ammonium nitrate, ammonium sulfate, urea), spacing (50 cm x 30 cm, 45 cm x 25 cm, 30 cm x 30 cm) as also the frequency of irrigation of crops (twice a week, once a week, during the period of critical rainwater shortage, no watering). The experiments used stevia

seedlings produced in multi-pots in a heated greenhouse. The experiments were set up at the beginning of June, and the collection was carried out in the first or second decade of September. During the experiments, plant material was collected twice for chemical analyses. Stevia leaves were analyzed for the content of dry matter, polyphenols, reducing sugars, nitrates, vitamin C, chlorophyll a, chlorophyll b, carotenoids, calcium, potassium, magnesium, phosphorus and steviol glycosides. Biometric parameters were also measured, including: plant height, lateral reach, number of first-order shoots and the number of leaves on a single shoot. During harvesting, the total yield of stevia herb, as well as leaves, shoots and waste was determined. The unit weight of individual plants and leaves and shoots obtained from them was also analyzed.

Field experiments have shown the possibility of growing stevia as an annual plant in the climate conditions of southwestern Poland and the significant impact of the factors used on its growth, yield and quality of the obtained raw material. Stevia plants grew on average to 57.3 cm in height, and their lateral spread was 29.3 cm. The influence of fertilization, spacing and irrigation frequency on stevia yield was demonstrated. The average yield of stevia herb grown in Poland was 2.088 $kg \cdot m^{-2}$ and ranged from 1.377 $kg \cdot m^{-2}$ to 2.580 $kg \cdot m^{-2}$. However, the weight of leaves obtained from stevia plantations was on average 1.233 $kg \cdot m^{-2}$ and ranged from 0.763 $kg \cdot m^{-2}$ to 1.490 $kg \cdot m^{-2}$.

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