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Research on the impact of planting schemes on the trait variability of *Vigna* varieties (*Vigna unguiculata* (L.) Walp. *subsp. sesquipedalis* (L.) Verdc.)

Iryna Bobos
PhD in Agricultural Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0001-5193-7192
Oleksandr Komar*
PhD in Agricultural Sciences
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0001-7511-4190
Ivan Fedosiy
PhD in Agricultural Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0002-5044-9960
Ivanna Havrys
PhD in Agricultural Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0001-5965-9916
Mykhailo Retman
PhD in Agricultural Sciences, Senior Researcher
Institute of Water Problems and Land Reclamation
of the National Academy of Agrarian Sciences of Ukraine
03022, 37 Vasylkivska Str., Kyiv, Ukraine
https://orcid.org/0000-0002-6972-2410

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Abstract. This research aimed to study the formation of asparagus bean yield, taking into account the influence of technological factors, including testing specific varieties based on changes in stand density. Among the primary methods used to investigate this issue were field experiments to examine the cultivation techniques and statistical

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*Corresponding author

analysis to assess the reliability of the results. This article presents the results of studies on sowing patterns: 70×10 cm, 70×25 cm (control), 70×40 cm, and 70×50 cm, on bush asparagus bean varieties Kafedralna (Ukraine) and U-Cha-Kontou (China) (control). Stand density significantly influenced the morphometric characteristics and productivity of the studied varieties. Increasing plant density to 143,000 plants/ha led to a significant increase (by 2-3 t/ha) in the yield of flat pods in both cultivars compared to the control (70×25 cm). The highest yield of flat pods (7.7-10.4 t/ha) was obtained for varieties at a density of 143,000 plants/ha. This is related to the optimal provision of plants with moisture, light, and nutrients at a given stand density. The Kafedralna variety generally exhibited a higher yield of flat pods than the U-Cha-Kontou variety. At lower seeding densities (29,000 plants/ha), the beans had a greater mass (120.5-152.0 g), but their number per plant was lower. Reducing stand density to 29,000 plants/ha led to an increase in the beans' dry matter, sugars, and vitamin C content. The Kafedralna variety had a higher content of these components under all sowing patterns. A strong correlation was found between biochemical indicators and stand density. The optimal sowing pattern for cowpeas to obtain flat pods in the Forest-Steppe zone of Ukraine can be considered 70×10 cm and 70×25 cm. The Kafedralna variety is recommended for open-field cultivation to obtain flat pods. The materials presented in the article have practical value for developing effective technologies for growing bush varieties of asparagus beans in the Forest-Steppe zone of Ukraine for vegetable production

Keywords: bush asparagus bean; variety; flat pods; planting scheme; plant density; yield; biochemical indicators

INTRODUCTION

Addressing the issue of providing the population with high-quality food products is a pressing concern worldwide. These products are primarily valued for their balanced content of nutrients, vitamins, and mineral salts such as iron, calcium, and phosphorus. However, no single crop can fully supply all the necessary nutrients for human consumption. Furthermore, there is a significant deficit of both animal and plant-based proteins. Therefore, it is essential to provide the population with high-protein foods. Plant-based proteins can be effectively obtained from legumes, a diverse group of crops cultivated globally. Authors S. Dhaliwal *et al.* (2020), D. Punniyamoorthy and S. Jegadeesan (2023) assert that cowpea is a valuable legume crop, serving as a readily accessible source of protein, vitamins, and mineral salts. Moreover, a key advantage of this crop is its high heat and drought tolerance, making it suitable for cultivation worldwide in the face of global warming. The significance of *Vigna* as a vegetable crop cannot be overstated. It is harvested at the technical maturity stage, specifically for its immature seeds and green beans. In the USA, high-quality sprouts are produced from the seeds of small-seeded varieties (Paraschivu *et al.,* 2021).

K. Akasapu and R. Uppaluri (2022) note that green beans reaching a length of 10-20 cm are primarily used in the preparation of frozen soup mixes. Beans up to 100 cm in length are bundled for market sale, which significantly enhances their commercial appeal. *Vigna unguiculata* L. exhibits a vast genetic diversity, as evidenced by the International Institute of Tropical Agriculture in Nigeria, where a genetic repository of 15,000 accessions is maintained (Boukar *et al.,* 2020). Although not as extensively documented in literature as other legumes, *Vigna* is often mistakenly identified as common beans. However, in terms of valuable properties, it is comparable to both beans and peas.

Asparagus bean is a subspecies resulting from a mutation in China. It is an ancient vegetable crop, cultivated in the Mediterranean, India, and Japan. The immature beans, often exceeding 90 cm in length, are consumed (Verma *et al.,* 2022). In Ukrainian markets, *Vigna* seeds can be found under the names "Chinese pea" or "lentil" (Bondarchuk *et al.,* 2022). Asparagus bean, or Cuban black-eyed pea, belongs to the vegetable variety of cowpea, *Vigna sesquipedalis* (L.) W.S. Wight. Asparagus bean is most widely cultivated in China, India, and African countries, where the mutation that led to the absence of the parchment layer in young beans likely occurred. This mutation gave rise to the vegetable variety (Kebede & Bekeko, 2020; Panzeri *et al.,* 2022).

The authors P. Vyshnivskyi and O. Furman (2020), and I. Fedosiy *et al.* (2022) highlight that this crop is promising for cultivation in Ukraine due to the sufficient amount of effective temperatures. At the National University of Life and Environmental Sciences of Ukraine, the Department of Vegetable Crops and Greenhouse conducted the first studies on *Vigna* between 2008 and 2011 in the northern part of the Forest-Steppe region. These studies assessed *Vigna* samples based on their morphological characteristics, maturity, and yield. A promising bush *Vigna* specimen was obtained, which was later used as a parental form in breeding programmes. As a result, the first bush *Vigna* vegetable variety, Kafedralna, was developed. This variety passed qualification examinations in 2023 and was granted a patent. In 2024, Kafedralna was included in the State Register of Plant Varieties of Ukraine (Patent No. 230332, 2023).

Considering the botanical and biological characteristics of the crop, it is possible to generate profit by cultivating it for flat pods and seed production. At the same time, the need arose to investigate planting schemes

and compare varieties in terms of productivity and biochemical traits of the beans, considering changing climatic conditions. Photosynthesis is a key process in the plant organism, influenced by various factors, with plant density and uniform distribution per unit area being the most significant. By optimally combining these factors, favourable conditions are created, ensuring equal access to light, moisture, and nutrients for each plant. This improves the phytosanitary condition of the agroecosystem, reducing the risk of diseases and pests.

Therefore, this research aimed to study the characteristics of yield formation in asparagus beans, considering the impact of technological elements, particularly testing different varieties based on changes in stand density of crops.

MATERIALS AND METHODS

Between 2014 and 2016, a research study was conducted at the National University of Life and Environmental Sciences of Ukraine (NULES) on the collection plots of the educational laboratory "Fruit and Vegetable Garden", located in the Kyiv Region without irrigation. The research was carried out in three replications using a two-factor experimental design (Bondarenko & Yakovenko, 2001). The planting schemes of the bush varieties Kafedralna (Ukraine) and U-Cha-Kontou (China) were studied, specifically: 70×10 (143), 70×25 (57), 70×40 (36), and 70×50 cm (29,000 plants/ha). The 70×25 cm pattern was used as a control. The total plot size was 75 m^2, and each individual plot was 5 m^2. Data was collected from 30 plants – 10 from each replication.

Previous research at the Department of Vegetable Crops, NULES Ukraine, identified the adaptive and high-yielding Chinese variety U-Cha-Kontou, which was used as a control. In addition, promising bush asparagus bean specimens studied between 2008 and 2011 were utilised in breeding programmes. As a result of this breeding work, the first bush variety in Ukraine, Kafedralna, was developed and included in studies to optimise plant density (Bobos *et al.,* 2022). The cultivation technology for bush asparagus beans is standard in production conditions. Seeds of the studied varieties were sown on 27 April across all variants simultaneously during 2014-2016. The sowing depth was 2.0-3.0 cm. Crop care included inter-row loosening, weed control, and protection against diseases and pests. During the initial growth period, a combination of high temperatures and low humidity led to the active spread of the common spider mite (Tetranuchis *trticeae* Kosh.) on plants. Significant damage was caused by aphids (*Aphidoidea*), which proliferated on all plants throughout the growing season. The pesticide Aktofit was applied (50 ml per 6-12 litres of water). Treatment with this biopesticide was conducted during the evening hours when the air temperature ranged from 15 to 25°C. The level of pest infestation was found to be similar across all varieties and sowing patterns.

Common bacterial blight (*Xanthomonas campestres pv. phaseoli* (Smith) Dye) was detected on the asparagus bean plants. The disease began to manifest in the second half of the growing season (July) following a decrease in temperature and an increase in soil and air humidity due to rainfall. The biopesticide Fitocid (10 ml per 10 litres of water) was applied. The plants were sprayed three times during the growing season: the first time when the disease first appeared on July 17th, and subsequently every 10 days. Flat pods (at technical maturity) were harvested simultaneously in all experimental variants weekly at the same time. Before harvesting, biometric measurements were taken. The number of beans and their weight per plant, as well as the length and number of seeds per pod, were counted during the harvesting process. Simultaneously with the yield calculation, a combined sample was taken for each variant to determine the "1,000-seed weight" index.

Biochemical analyses of the flat pods were conducted at the Laboratory of Biochemical and Technological Quality Indicators at the Ukrainian Institute of Plant Variety Examination using standard methods. Samples were collected at the stage of technical maturity. The collection plot is located in the Forest-Steppe zone with a moderately continental climate, characterised by mild winters. The average long-term temperature in January, the coldest month, is – 6.5°C, and in July, the warmest month, is +19.8°C. According to long-term observations, the lowest recorded temperature was -36°C and the highest was +39°C. The total sum of active temperatures is 2440-2700°C. Overall, the combination of temperatures, moisture conditions, and necessary irrigation during the research years was favourable for the growth and development of asparagus beans, allowing for the observation of flat pod formation in the different varieties.

The soil in the area is dark grey, moderately podsolised, and consists of light loam, with a slightly acidic reaction. The thickness of the humus horizon measures 24-28 cm. The experimental site is characterised by a low humus content of 1.5-2.2%, a moderate level of hydrolysable nitrogen at 26-38 mg/kg, and available phosphorus and potassium levels of 43-61 mg/kg and 28-34 mg/kg, respectively. The depth of the plough layer was 20-22 cm. The crop rotation included cucumber in 2014, tomato in 2015, and white cabbage in 2016. In autumn, the plant residues from the preceding crop and weeds were destroyed, followed by deep autumn ploughing. Seven days before sowing, a fertiliser mix of $N_{60}P_{40}K_{90}$ (ammonium nitrate, superphosphate, and potassium chloride) was applied. During the first ten days of April, before sowing, the experimental area was cultivated to a depth of 12-15 cm using the KPSP-4 cultivator.

Statistical analysis, specifically analysis of variance (ANOVA) and correlation analysis was performed using the XLSTAT add-in for Microsoft Excel. Differences were considered statistically significant at the $\alpha = 0.95$ level

(Rao, 2018). The authors adhered to the standards set by the Convention on Biological Diversity (1992) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1979).

RESULTS AND DISCUSSION

During the years of research, it was found that the yield of *Vigna* was significantly influenced by the varietal characteristics of the plants and their density per unit area. Varieties sown at a density of 143,000 plants per hectare yielded significantly higher bean crops – 7.7-10.4 tonnes per hectare, which is 2-3 tonnes per hectare more than the control (Table 1). One of the most important characteristics of *Vigna* flat pods is the absence of a parchment layer and fibres. It is widely accepted that the highest quality varieties are those whose flat pods do not thicken over a long period and do not form a parchment layer or fibres throughout the entire harvest period. The variety Kafedralna was characterised by the formation of a weak parchment layer and fibres in the flat pods under conditions of high air temperature, despite delayed harvesting.

***Table 1**. Productivity indicators of asparagus bean varieties at different plant stand densities (average for 2014-2016)*

Experimental variant (factor B)	Plant density, thousand plants/ha	The average weight of beans in the phase of technical maturity, g	Average number of beans per plant, pcs.	Weight of beans per plant at the stage of technical maturity, g	Yields of commercial flat pods, t/ha
U-Cha-Kontou (control) (*factor A*)					
70×10 cm	143	5.7	9.6	53.7	7,7
70×25 cm (control)	57	6.0	16.8	100.2	5,7
70×40 cm	36	6.5	17.3	109.8	3,9
70×50 cm	29	6.7	18.5	120.5	3,5
Kafedralna					
70×10 cm	143	7.1	10.2	72.4	10,4
70×25 cm (control)	57	7.4	17.5	129.5	7,4
70×40 cm	36	7.7	17.8	137.1	4,9
70×50 cm	29	8.3	18.3	152.0	4,4
LSD_{05}		1.92	1.82	32.60	1.49
factor A		0.96	0.91	16.30	0.74
factor B		1.36	1.29	23.05	1.05

***Source:** developed by the authors based on the conducted research*

Heavier beans were obtained from *Vigna* varieties planted at the lowest density of 29,000 plants per hectare. For the U-Cha-Kontou variety, the average pod weight was 120.5 g, and for Kafedralna, it was 152.0 g. This represents an increase of 20.3-22.2 g compared to the control. At the same time, the sparser plantings resulted in a greater number of flat pods formed: 18.3-18.5 per plant, with an average bean weight of 6.7-8.3 g. Despite these higher metrics, the average yield of flat pods in the *Vigna* varieties was found to be higher at a density of 143,000 plants per hectare, ranging from 7.7 to 10.4 tonnes per hectare. This is attributed to the greater number of plants per unit area.

Lower yields of flat pods were obtained at a plant density of 29,000 plants per hectare for the U-Cha-Kontou variety (3.5 t/ha) and the Kafedralna variety (4.4 t/ha), which is 2.2-3.0 t/ha less than the control. Additionally, the U-Cha-Kontou variety consistently produced lower yields of flat pods compared to the Kafedralna variety across all planting patterns (Fig. 1). Despite higher productivity and a greater number of beans per plant, the lower bean yield in *Vigna* varieties was attributed to the lower plant density per unit area. Significant differences were found for factor B in all economic and valuable traits studied.

The productivity of asparagus bean plants influenced their average yield of flat pods. Due to the non-simultaneous ripening of beans at different plant densities, the crop was harvested weekly for each cultivar (Fig. 2). Consequently, the yield increased with the number of plants per unit area. At a plant density of 29,000 plants per hectare, the lowest yield was observed at 3.5-4.4 t/ha. This trend could be attributed to the lower plant density per plot, while the average number of beans per plant and their weight were higher.

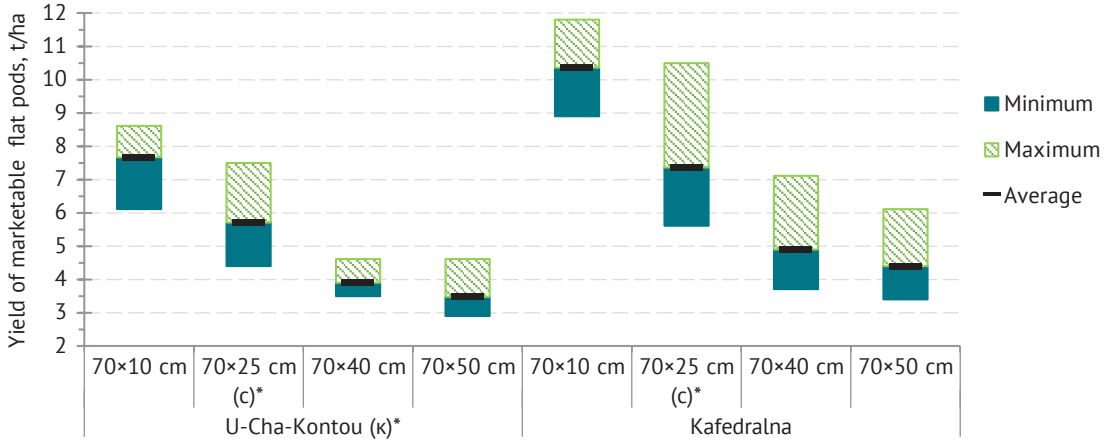

***Figure 1**. The impact of plant density of bush Vigna varieties on the yield of marketable flat pods, t/ha (2014-2016)*
***Note:** (c)* – control*
***Source:** developed by the authors based on the conducted research Yield of marketable flat pods, t/ha*

***Figure 2**. Non-simultaneous ripening of beans in the Kafedralna variety*
***Source:** developed by the authors based on the conducted research*

The results obtained indicate that varying plant density has a significant impact on economic and valuable traits, as plants are in constant competition with each other for light, water, and nutrients throughout their life cycle. Consequently, with less dense plantings, plants receive better lighting, more favourable conditions for nutrition, and there is a better sanitary condition of the plot, which in turn contributes to higher yields. However, the yield of *Vigna* varieties was higher in denser plantings due to the greater number of plants, which affected the overall output per unit area. The optimal plant density for bush *Vigna* varieties in open ground for obtaining flat pods can be considered to be from 57 to 143 thousand plants per hectare, at which the marketable yield of flat pods for the U-Cha-Kontou and Kafedralna varieties was, respectively, 5.7-7.7 and 7.4-10.4 t/ha.

The accumulation and formation of organic matter by plants is a completely autonomous process that does not require human intervention. However, the intensity of dry organic matter accumulation in plant product organs and their quality indicators are variable, as their magnitude is determined by the influence of both organised and unorganised environmental factors. Research has established that the biochemical indicators of asparagus beans at technical maturity depend on plant density (Fig. 3).

Based on the biochemical analysis of the studied varieties, at lower plant densities (29,000 plants/ha), the quality indicators of the beans improved, specifically: the dry matter content was between 13.1-13.4%, sugars at 3.6-4.0%, vitamin C at 32.8-37.1 mg/100 g of fresh weight, and crude protein at 3.4-3.5 mg/100 g of fresh weight. Due to the fact that plants in sparse plantings receive sufficient light, their nutrient uptake and microclimate are improved, which contributed to the formation of beans with higher biochemical indicators. As the plant density approached 143,000 plants/ha, there was a significant decrease in the quality indicators of the beans. In this case, the dry matter content varied between varieties from 12.5 to 12.7%, sugars from 2.9 to 3.0%, vitamin C from 30.4 to 33.6 mg/100 g fresh weight, and crude protein from 3.2 to 3.4 mg/100 g fresh weight.

Among the varieties, the Kafedralna variety stood out as having the most valuable biochemical indicators. Regardless of plant density, this variety consistently exhibited a dry matter content of 12.7-13.4%, sugars of 3.0-4.0%, vitamin C of 33.6-37.1 mg/100g fresh weight, and crude protein of 3.2-3.7%. Correlational analysis for the U-Cha-Kontou (control) variety revealed a strong positive correlation between dry matter and total sugars (r = 0.98), crude protein (r = 0.99), and

vitamin C (r = 0.93); between total sugars and crude protein (r = 0.95), and vitamin C (r = 0.97); and between crude protein and vitamin C (r = 0.87) (Table 2). A strong negative correlation was also found between plant density and dry matter (r = -0.91), total sugars (r = -0.93), crude protein (r = -0.90), and vitamin C (r = -0.84).

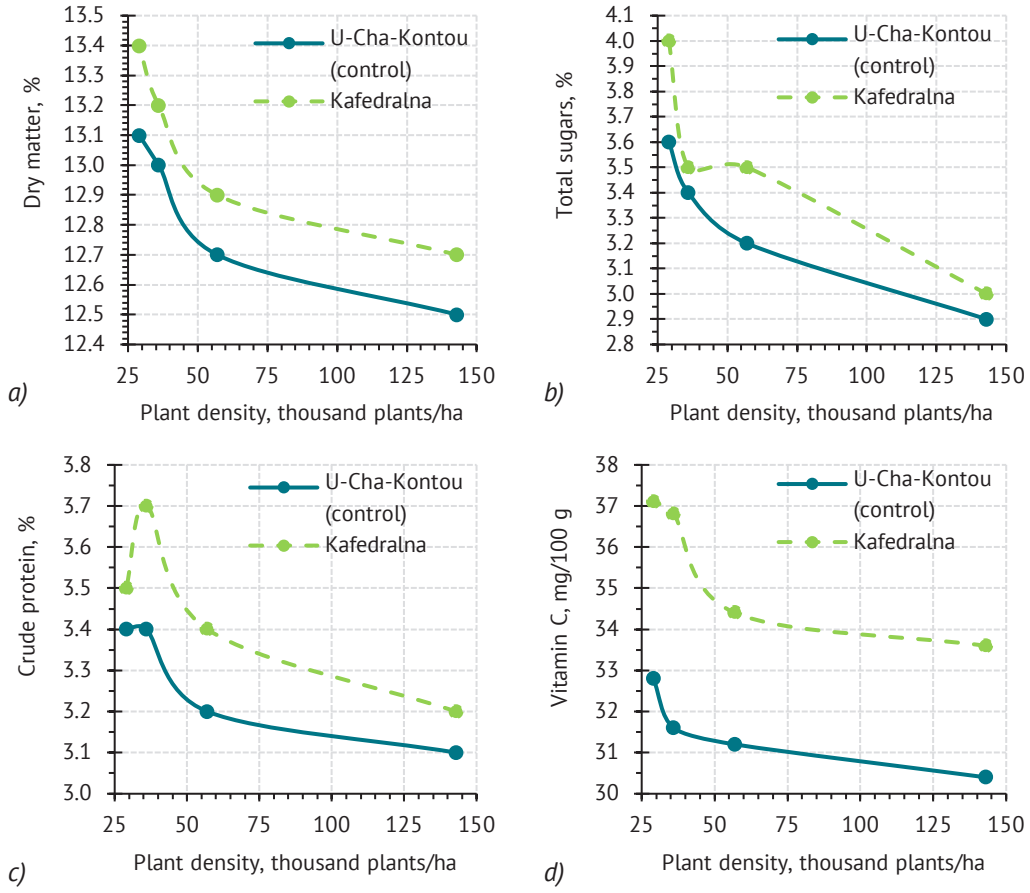

***Figure 3**. Biochemical indicators of asparagus bean flat pods at technical maturity at different plant densities (average for 2014-2016)*

***Note:** a) dry matter, % (LSD_{05} 0.23; factor A (LSD_{05} 0.11; factor B (LSD_{05} 0.16); b) total sugars, % (LSD_{05} 0.19; factor A (LSD_{05} 0.09; factor B (LSD_{05} 0.13); c) crude protein, % (LSD_{05} 0.17; factor A (LSD_{05} 0.09; factor B (LSD_{05} 0.12); d) vitamin C, mg/100g (LSD_{05} 1.55; factor A (LSD_{05} 0.77; factor B (LSD_{05} 1.10)*

***Source:** developed by the authors based on the conducted research*

***Table 2**. Correlation matrix between the biochemical composition of asparagus bean flat pods (average for 2014-2016)*

Variety	Parameter	Plant density, thousand units/ha	Dry matter, %	Total sugars, %	Crude protein, %	Vitamin C, mg/100g
U-Cha-Kontou (control)	Plant density, thousand units/ha	1				
	Dry matter, %	-0.91	1			
	Total sugars, %	-0.93	0.98	1		
	Crude protein, %	-0.90	0.99	0.95	1	
	Vitamin C, mg/100 g	-0.84	0.93	0.97	0.87	1
Kafedralna	Plant density, thousand units/ha	1				
	Dry matter, %	-0.88	1			
	Total sugars, %	-0.89	0.92	1		
	Crude protein, %	-0.74	0.93	0.71	1	
	Vitamin C, mg/100 g	-0.67	0.49	0.79	0.14	1

***Source:** developed by the authors based on the conducted research*

A strong positive correlation was observed in the Kafedralna variety between dry matter and total sugars (r = 0.92), crude protein (r = 0.93); between total sugars and crude protein (r = 0.71), and vitamin C (r = 0.79). Additionally, a moderate positive correlation was found between dry matter and vitamin C (r = 0.49). There was also a strong negative correlation between plant density and dry matter (r = -0.88), total sugars (r = -0.89), crude protein (r = -0.74), and vitamin C (r = -0.67). However, the Kafedralna variety proved to be more adaptable to growing conditions with high biochemical indicators of beans at technical maturity. *Vigna* yields are low in dense plantings, especially in the African region (0.025-0.3 t/ha). This is due to the widespread prevalence of pests, plant diseases, reduced soil fertility, drought, improper cultivation techniques, unsuitable varieties, unprofessional seed systems, and various socioeconomic constraints.

Sowing density needs to be regulated to achieve maximum yield, as competition between plants exists after emergence. For the growth and development of leguminous crops such as *Vigna*, sowing density is of particular importance. The results obtained in the studies are consistent with L. Bastos *et al.* (2020), who state that seed weight decreases with increasing sowing rates of *Vigna*. This response is due to competition for light and mineral nutrients, as high plant density reduces the distribution of assimilates. At the same time, varieties with lower plant density formed greater biomass and allocated more assimilate to seeds, leading to higher plant productivity. The obtained results agree with the data of B. Abebe and M. Alemayehu (2022). They argue that a plant spacing of 40×40 cm facilitates light circulation for better photochemical processes, while at high-density plants shade each other. Thus, light slowly disperses to all parts of the plant, especially to the leaves located in the lower part.

It was established that lower plant density increased the number of shoots and beans per plant. These results confirm the findings of N. Tehulie *et al.* (2021). At the same time, studies conducted on soybeans indicate that a high seeding rate delays flowering and reduces the number of shoots (Nleya *et al.,* 2020). Additionally, excessive narrowing or widening of row spacing also leads to a decrease in soybean grain yield. Optimal plant density can vary significantly between regions. For *Vigna* varieties with different morphological plant structures, different optimal densities are required to ensure high seed and bean yields with high-quality indicators. Also, the sowing density of *Vigna* affects the yield of varieties with different maturity groups. Very early maturing varieties such as IT99K573-2-1 and IT98K-205-8 are recommended for the Sahel and semi-arid regions, which helps to avoid the negative consequences of drought (Senyk, 2020).

Plantings with high densities of 62.5 thousand plants/ha (40×40 cm) and 125 thousand plants/ha (40×20 cm) proved to be the most effective for increasing *Vigna* yield in West Africa (Ishikawa *et al.,* 2022). According to the results of the economic efficiency of *Vigna* production in India, it was found that growing the Yardlong variety in open fields at a plant density of 74 thousand plants/ha (45 cm×30 cm) was more profitable (Manjesh *et al.,* 2019). The results of this study showed that at plant densities ranging from 57 to 143 thousand plants/ha, the maximum marketable yield of flat pods was formed in both studied varieties.

Plant density can be regulated not only by the sowing pattern but also by the number of seeds per planting hole. L. Day *et al.* (2022) argue that when sowing one seed per planting hole, the plant develops optimally and, consequently, yields a higher harvest. Similar results were reported by Y. Gnamien *et al.* (2023). Scientists indicate that at a lower density of 62.5 thousand plants/ha (40 cm×40 cm) with 1 plant per hole, a higher yield was obtained compared to a higher density of 250 thousand plants/ha (20 cm×20 cm) and 2 plants per hole. However, these conclusions diverge from the data of M. Duraipandian *et al.* (2022). According to the research of these authors, *Vigna* yield was higher when sowing three seeds per planting hole. This difference could be due to the varying distance between plants.

A higher incidence of common bacterial blight was observed in denser plantings. A similar trend was observed in the studies of R. Lal (2020) and S. Parveen *et al.* (2022), where more rust infection was found at row widths of 45×30 cm and less at 60×75 cm The study conducted by the authors also found that disease spread was slower in the Kafedralna variety compared to U-Cha-Kontou. The results showed that the biological characteristics of the variety, along with ecological and agronomic factors, influence the dynamics of vegetative mass formation and the intensity of plant photosynthesis, determining the rate of growth and development and assimilation processes of the crop. The higher yield of flat pods at a shorter distance between plants in a row was due to an increase in the number of plants per unit area. At the same time, fewer pods were obtained per plant with a lower average mass. A significant impact of plant density on the biochemical indicators of bean varieties and their interaction was established.

CONCLUSIONS

An optimal plant density for bush asparagus beans grown in open ground can be considered to be between 57,000 and 143,000 plants per hectare, resulting in marketable flat pod yields of 5.7-7.7 and 7.4-10.4 tonnes per hectare for the varieties U-Cha-Kontou and Kafedralna, respectively. The Kafedralna variety exhibited higher biochemical indicators, particularly concerning dry matter content (12.7-13.4%), sugar content (3.0-4.0%), vitamin C content (33.6-36.8 mg/100 g fresh weight), and crude protein content (3.2-3.5%) across different stand densities.

A strong correlation was found between biochemical indicators and plant density in the *Vigna* varieties. The dry matter content of the beans had a strong positive correlation with total sugar content (r = 0.92 – 0.98) and a strong negative correlation with plant density (r = -0.88 – 0.91). There was also a strong negative correlation between plant density and total sugars (r = -0.89 – 0.93), crude protein (r = -0.74 – 0.90), and vitamin C (r = -0.67 – 0.84). Future research should focus on using wild forms in *Vigna* breeding to create cultivars resistant to biotic and abiotic factors.

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None.

CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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Дослідження впливу схеми сівби на мінливість ознак сортів вігни спаржевої (*Vigna unguiculata* (L.) Walp. *subsp. sesquipedalis* (L.) Verdc.)

Ірина Бобось
Кандидат сільськогосподарських наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0001-5193-7192
Олександр Комар
Кандидат сільськогосподарських наук
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0001-7511-4190
Іван Федосій
Кандидат сільськогосподарських наук
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0002-5044-9960
Іванна Гаврись
Кандидат сільськогосподарських наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0001-5965-9916
Михайло Ретьман
Кандидат сільськогосподарських наук, старший дослідник
Інститут водних проблем і меліорації Національної академії аграрних наук України
03022, вул. Васильківська, 37, м. Київ, Україна
https://orcid.org/0000-0002-6972-2410

Анотація. Метою досліджень було вивчення особливостей формування врожайності вігни спаржевої з урахуванням впливу елементів технології, що передбачають випробування окремих сортів, на основі зміни густоти стояння посівів. Серед основних методів вивчення даної проблеми є польовий – для дослідження елементів технології вирощування, статистичний – для оцінювання достовірності результатів. У статті представлено результати досліджень схем сівби рослин: 70×10 см, 70×25 см (контроль), 70×40 см, 70×50 см на сортах кущової вігни спаржевої Кафедральна (Україна) та У-тя-Контоу (Китай) (контроль). Густота стояння рослин значно впливає на морфометричні показники та продуктивність досліджуваних сортів. Збільшення густоти посіву до 143 тис. шт./га призвело до значного збільшення (на 2-3 т/га) врожайності бобів-лопаток у обох сортів порівняно з контролем (70×25 см). Найвищу врожайність бобів-лопаток (7,7-10,4 т/га) отримано у сортів за густоти 143 тис. шт./га. Це пов'язано з оптимальним забезпеченням рослин вологою, світлом та поживними речовинами при даній густоті стояння. Сорт Кафедральна загалом характеризувався вищою врожайністю бобів-лопаток, ніж сорт У-тя-Контоу. За меншої густоти посіву (29 тис. шт./га) боби мали більшу масу (120,5-152,0 г), але їх кількість на рослині була меншою. Зменшення густоти стояння до 29 тис. шт./га призводило до збільшення вмісту сухої речовини, цукрів та вітаміну С в бобах. Сорт Кафедральна за всіма схемами сівби мав вищий вміст цих компонентів. Встановлено сильний кореляційний зв'язок між біохімічними показниками та густотою стояння. Оптимальною схемою посіву вігни овочевої для отримання бобів-лопаток в умовах Лісостепу України можна вважати 70×10 см та 70×25 см. Сорт Кафедральна рекомендується для вирощування у відкритому ґрунті з метою отримання бобів-лопаток. Наведені в статті матеріали мають практичну цінність для розробки ефективних технологій вирощування кущових сортів вігни в умовах Лісостепу України для овочевого напрямку

Ключові слова: кущова вігна спаржева; сорт; боби-лопатки; схема сівби; густота рослин; урожайність; біохімічні показники