

## FEATURES OF THE TECHNOLOGY OF GROWING *Allium ursinum* L. IN UKRAINE

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**Summary.** The possibility of growing *Allium ursinum* L., in the field conditions of the left-bank forest-steppe of Ukraine has been established. Studies have been carried out to establish the influence of the density of *Allium ursinum* L., planting on the yield of dry leaves. A tendency to increase crop productivity with an increase in planting density has been revealed. The highest yield of dry raw materials among the studied variants was obtained with a planting density of 444 thousand plants/ha.

**Keywords:** reproduction, planting density, dry raw materials, yield.

### Introduction

*Allium ursinum* L. is a perennial herbaceous plant of the onion family, also known as wild garlic, bear garlic, bear onion, levurda, wild garlic. It is found in most of Europe. A rare species listed in the Red Book of Ukraine. The medicinal raw material of wild garlic is the aerial part – dry *Allii ursini Herba*.

The chemical composition of the aerial part of wild garlic is distinguished by the variety and richness of various substances. *Allium ursinum* L. contains a lot of vitamin C (10-15 times more than in lemon or orange fruits). All parts of the plant contain essential oil with a garlic scent, the content of which reaches up to 0,07%. The composition of the essential oil includes allyl sulfides, allyl polysulfides, pinelic acid, alliin.

*Allium ursinum* L. helps to increase appetite and stimulates the gastrointestinal tract. Wild garlic is also a prophylactic and medicinal remedy for vitamin deficiencies and is used as an antiscorbutic drug. The use of *Allium ursinum* L. does not allow the accumulation of cholesterol in the blood, stimulates the cardiovascular system and normalizes metabolism. Phytoncides and biologically active substances contained in wild garlic cause bactericidal, tonic, antiparasitic, diuretic and tonic effects.

Since it is forbidden to harvest *Allium ursinum* L. in natural conditions, and the pharmaceutical industry needs its raw materials, the Research Station of the Medicinal Plants of the Institute of Agroecology and Environmental Management of the NAAS of Ukraine has begun research on the development of elements of its cultivation technology.

### Materials and methods

The research was carried out in the fields of the Research Station of the Medicinal Plants of the IAEM of the NAAS during 2021–2024. On the area where the field experiment was laid, winter wheat served as a predecessor. The soil of the experimental field is thick, low-humus chernozem, the thickness of the humus horizon is 87–100 cm, light in particle size distribution. The reaction of the soil solution is slightly acidic, in terms of exchangeable acidity, the soil is characterized as moderately acidic. Provision of the soil with the main nutrients: easily hydrolyzed nitrogen – low, mobile phosphorus – very high, exchangeable potassium – increased. The total size of the plots is 25–45 m<sup>2</sup>, accounting – 20–30 m<sup>2</sup>, with four repetitions.

The object of research was *Allium ursinum* L. During the research, methodological approaches were used, which are used in domestic scientific practice and in medicinal plant growing. In particular, the development of experimental schemes was carried out according to the methods of Dospekhov B.O. and Romashchenko M.I. Plant sampling, biometric measurements and phenological observations were carried out taking into account the characteristics of medicinal cultures according to the methods of A.I. Brykin and O.A. Advice.

Experimental plot of *Allium ursinum* L. was planted vegetatively (bulbs) in the first decade of April 2021. Planting was carried out with a density of 111,1 thousand plants/ha (according to the scheme 45x20 cm), 148,1 thousand plants/ha (according to the scheme 45x15 cm), 222,2 thousand plants/ha (according to the scheme 45x10 cm), 444,4 thousand plants/ha (according to the scheme 45x5 cm).

The raw material of *Allium ursinum* L. is air-dry *Allii ursini Herba*, harvesting was carried out in the budding phase, in the first year of the growing season (2021), yield accounting was not carried out due to low plant productivity. The collected raw materials were dried in a natural dryer to a moisture content of 10-12%.

### Results and discussion

During the experimental period, it was found that *Allium ursinum* L. winters well in the field, no plant attacks were recorded. The regrowth of the above-ground mass was recorded in the first decade of April, only 2024 stood out, due to a sharp increase in air temperatures, the regrowth of plants was recorded in the third decade of April. *Allium ursinum* L. entered the budding phase in the third decade of April, flowering in the first decade of May, fruiting in the third decade of May. During June, the aerial part of the *Allium ursinum* L died off, the plants entered a dormant state until the spring of the next year.

Counts of *Allium ursinum* L leaf productivity were carried out before flowering in the budding phase.



**Budding phase**



**Flowering phase**

**Figure 1. *Allium ursinum* L. – in a cultural setting**

The obtained data indicate a direct dependence of the yield of *Allium ursinum* L. raw materials on the density of planting. With an increase in the number of plants per 1 ha, the yield of the crop increased. So, in the version with a density of 111 thousand plants/ha. The yield of freshly harvested raw materials – leaves was 1264 kg/ha, dry raw materials – 159 kg. Increase in plant density to 148 thousand plants/ha growth/ha contributed to an increase in yield up to 1933 kg/ha of freshly harvested raw materials (266 kg/ha of dry raw materials). The highest yield of freshly harvested raw materials of 3995 kg/ha, respectively, dry raw materials of 524 kg/ha was obtained in the variant with a density of 444 thousand plants/ha (Table 1).

Table 1

**The yield of *Allium ursinum* L., depending on the density of plant cultivation, is average for 2022-2024**

| Options<br>Planting density (planting<br>scheme) | Crude yield,<br>kg/ha | Yield of dry<br>raw materials,<br>kg/ha | Yield of dry raw<br>materials from wet<br>weight, % | Leaf area,<br>m <sup>2</sup> /ha |
|--------------------------------------------------|-----------------------|-----------------------------------------|-----------------------------------------------------|----------------------------------|
| 111 thousand plants/ha (45x20)                   | 1264                  | 159                                     | 12,6                                                | 2616                             |
| 148 thousand plants/ha (45x15)                   | 1933                  | 266                                     | 13,7                                                | 4002                             |
| 222 thousand plants/ha (45x10)                   | 2830                  | 406                                     | 14,3                                                | 5858                             |
| 444 thousand plants/ha (45x5)                    | 3995                  | 524                                     | 13,1                                                | 8269                             |
| LSD 0,5                                          | 29                    | 12                                      | 1,7                                                 | 14                               |

The yield of dry raw materials from the wet weight was 12,6 – 14,3 %. The area of the leaf apparatus of *Allium ursinum* L. in the variant with the lowest density is 111 thousand plants/ha. was 2616 m<sup>2</sup>/ha. With an increase in the number of plants per unit area to 444 thousand plants/ha. It was the largest and amounted to 8269 m<sup>2</sup>/ha.

In terms of years of research, the productivity of *Allium ursinum* L. depended on the growing season and weather conditions. In 2022, the yield of dry *Allium ursinum* L. leaves was the lowest and amounted to 51 kg/ha in the variant with a density of 111 thousand plants/ha, increase in cultivation density to 148 and 222 thousand plants/ha contributed to an increase in yield to 67 and 112 kg/ha. The highest productivity of 235 kg/ha was in the variant with the highest density of 444 thousand plants/ha (P. 2.)

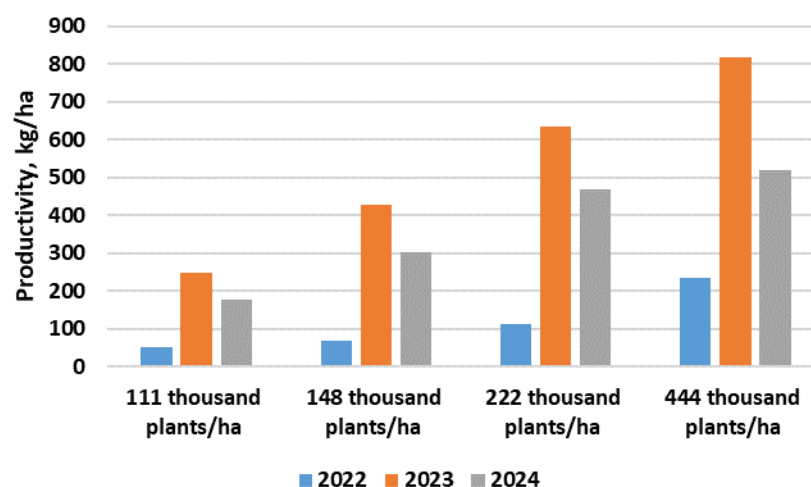


**Figure 2. Yield of dry *Allium ursinum* L. leaves depending on the growing season and growing density**

In 2023, *Allium ursinum* L. plants were more developed compared to previous years, their productivity was the highest and ranged from 249 to 819 kg/ha of dry leaves, depending on the density of planting. In 2024, during the period of growth and development of *Allium ursinum* L., there was a significant increase in air temperature relative to the long-term average, sunburn was observed on the leaves, which negatively affected the productivity of the crop. The yield of dry leaves was in the variant with a density of 111 thousand plants/ha was 178 kg/ha, in the variant with a density of 444 thousand plants/ha – 519 kg/ha.

## Conclusions

During the research, it was found that *Allium ursinum* L., can be grown in the field conditions of the left-bank forest-steppe of Ukraine. Soil and climatic conditions are suitable for the formation of a full-fledged crop. It was also established that the yield of leaves depends on the density of cultivation, with an increase in density, productivity increased. The highest yield of raw materials of 524 kg/ha, on average over the years of research, was obtained in the variant with the highest cultivation density of 444 thousand plants/ha.

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