

dwelling species, but also the entire community. While the condition of the trees will improve no more than slightly over the same period of time.

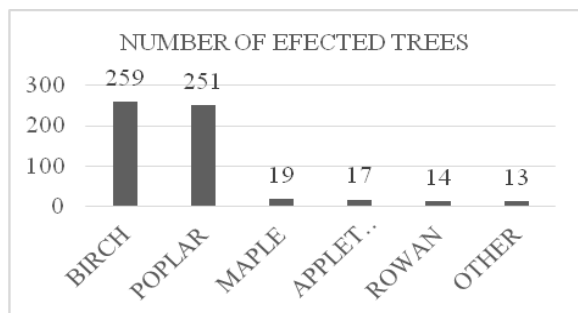


Fig. 1. – Number of effected trees



Fig. 2. – The number of mistletoe: j – juvenile plants, g – plants of the first generative age, s – plants of the second generative age

Currently, it is necessary to develop methods to control the number of *V. album* L., as well as, in the case of cleaning areas from parasitic plants, to determine the direction of biological monitoring of the consequences. Registration and analysis of positive or negative processes resulting from the decline in the number of white mistletoe will help to avoid undesirable biological manifestations [2].

### BIBLIOGRAPHY

1. Вергелес, Ю. І. Методичні вказівки до виконання розрахунково-графічної роботи «Комплексна порівняльна ландшафтно-екологічна характеристика ділянок міської території, що належать до різних функціональних зон» / Ю. І. Вергелес, І. О. Рибалка. – Харків: ХНАМГ, 2011. 18 с.
2. Юрель, В. А. Инвазия омелы белой (*Viscum album* L.) в Беларуси, определение ее численности и возрастной структуры / В. А. Юрель, Ю. Г. Лях // Сахаровские чтения 2019 года: экологические проблемы XXI века: Материалы 19-й междунар. науч. конф. – Минск, 2019. – Т. 2. – С. 222–226.

### APPROACHES TO CALCULATION OF WATER USE FOR ENTERPRISES OF DAIRY INDUSTRY

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Peculiarities of development of individual technological standards of water use and disposal at enterprises of dairy industry have been shown.

**Keywords:** standards of water use, rate setting, specific character of the production process.

Development of individual technological standards of water use is one of the ways of water use and disposal volumes regulation at enterprises. Individual technological standards (ITS) of water use are worked out for the following purposes:

- planning of production activities by the enterprise;
- setting of limits for the enterprise for production (withdrawal) volume of water resources, effluents discharge to sewage networks, environment;
- design of water supply and sewage systems;
- control of the rational use of water resources at the enterprise.

Some factors should be taken into account during development of water use standards for enterprises of the dairy industry:

1. Butter milk, whey, cream, skimmed milk, whole milk powder, skimmed milk powder may be supplied as the source raw material, apart from raw milk.
2. A part of raw milk delivered to the enterprise can only pass primary treatment (separation, pasteurization, cooling) and be transferred for further treatment to another enterprise without the use of this milk for domestic production.
3. Formation of by-products of milk processing.

4. Formation of extra inflows in sewage networks of the enterprise: permeate, steam, detergents and disinfecting solutions.

5. Availability of repeated water supply systems (the use of water after the last rinsing of equipment for the first washing of equipment).

Therefore, development of the ITS of water use for dairy industry enterprises can be carried out in accordance with several schemes.

**Scheme 1.** At the stage of designing the enterprise it is recommended that the ITS of water use should be developed per 1 ton of the processed raw materials with the account of receiving line capacity and planned operation mode of the enterprise.

**Scheme 2.** Several approaches to development of the ITS of water use are possible for the operating enterprise:

2.1. When 1–2 types of products are output (for example, cheese and concentrated (dry) whey), it is recommended that it should be developed per 1 ton of the processed raw materials.

2.2. When the product is output in a large assortment, it is recommended that it should be developed per 1 ton of each type of the finished product (butter, cheese, cream, kefir).

2.3. Development is possible for each production shop (section) per 1 ton of processed raw materials delivered to every shop.

2.4. When only primary milk procession takes place (separation, pasteurization, cooling) and milk transfer for further processing to another enterprise, individual of the ITS of water use should be calculated for the given volume of milk.

Also, quality of waste waters formed during the production process is an important aspect in standardization of the use of water. The present worked out methods of standardization of the use of water at enterprises of the dairy industry will make it possible to take into consideration the following components: volume of raw materials, volume and assortment of output products, volume of water consumption and disposal depending on the used production processes.

## HEAVY METAL HYPERACCUMULATORS AND THE DEVELOPMENT OF URBAN SOIL REMEDIATION STRATEGIES

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In the conditions of soil culture the possibility of use of phytoremediation of urban soils with shepherd's purse and alfalfa blue was investigated. It was found that when grown on sod-podzolic soils: sandy loam and loamy, nickel accumulates in large quantities in the rhizosphere, as a shepherd's purse and alfalfa blue, and removal of nickel from loamy soil investigated plant species is 2–3 times more effective than from sandy loam. With the joint cultivation of a shepherd's purse with legumes (synthesizing polysaccharides), the availability of heavy metals in the rhizosphere and their extraction from the soil increases. The results will serve as a basis for the development of recommendations for the treatment of contaminated areas of heavy metals, and the proposed method of soil purification from heavy metals will reduce their accumulation in food and improve the economic and social efficiency of agricultural production.

**Keywords:** phytoremediation, rhizosphere, heavy metals, vegetative organs, bacteria.

The purpose of the work is to study the possibility of using herbaceous plants of alfalfa blue (*Medicago sativa* L.) and – a shepherd's purse (*Capsella bursa-pastoris*) for phytoremediation of agricultural soils (sod-podzolic: sandy loamy and loamy). To assess the toxic effect of nickel ions on plant growth and development, germination energy, laboratory germination and growth of both the hyperaccumulator plant and the legume plant synthesizing exogenous polysaccharides were taken into account. As a control, seeds germinated on tap water were used.

As a result of the conducted research, the absence of the primary toxic effect of nickel ions in a concentration of 0,05; 0,1 and 0,3 mg / l on the viability of the shepherd's purse and alfalfa blue seeds. The toxic effects of nickel are not detected in the early stages of plant ontogenesis, and therefore meristematic cells do not cease to divide, and the plant continues to grow and accumulate vegetative mass.