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LINSEED GERMINATION DEPENDING ON STORAGE TEMPERATURES

Analysis of recent researches and publications. To maintain viability – is biological adaptation and resistance of seeds to changing of environmental conditions. Longevity is a consequence of ability to save life in environment and mainly depends on internal factors – the level and nature of the metabolism of seeds. Therefore, seeds of different species have different storage duration. Now, unfortunately, there is not enough information about relationship between chemical composition of seeds, conditions of storage and its longevity [1]. The chemical composition and morphology of seeds are primarily a species and varietal trait, but are also determined by conditions of its formation, which may lead to changes that often exceed the varietal values [4,7].

The effect of destructive factors during post-harvest maturing, seeds storage in adverse conditions, or prolonged storage result that the seeds loses its ability to germinate and die. Germination is not possible if the spare substances are largely or completely used. During storage in favourable conditions, spare substances are stored and their chemical composition is less variable.

According to M.S. Navashin and O.M. Gerasimova, even in dry seed during the storage, continue take place some changes that occur more vigorously, the longer seed is stored [6].

At the same time, oilseeds quickly lose viability under uncontrolled conditions [8]. This is due to lipid peroxidation (lipids are abundant in seeds) and other biochemical processes, which leads to destruction of membranes, including mitochondrial ones [3].

The causes of seeds aging by Harrington are diverse processes – chromosome destruction, loss of respiratory activity, toxic compounds formation, destruction of hormones necessary for germination, proteins denaturation, and fats self-oxidation. A large

number of factors that lead to loss of seeds viability do not give possibility to predict changes that occur in the seed during storage in adverse conditions [2].

Seeds of oil crops have some specificity of storage, since spare substances, which used by bud for germination, is deposited in the seed in form of fats. Fat is not able to keep and bind moisture like proteins and starch. During storage, there is a rapid self-warming of seeds through the breath, which occurs mainly due to fats. This is explained by the fact that fats oxidization release more heat than carbohydrates. As result, the quality of commercial seed, and especially the seeds intended for sowing, is reduced [5].

The **purpose of study** was to establish the influence of temperature regime during the seeds storage of different linseed varieties on its germination.

Materials and methods of research. In order to determine germination of linseed under different temperature regimes of storage during 2016-2017 was carried out research at the educational research laboratory “Analytical studies in Plant growing” Plant Growing department of the National University of Life and Environmental Sciences of Ukraine. Six domestic varieties of linseed were chosen – Iceberg, Vodograi, Blakytno-Pomaranchevyi, Evryka, Pivdenna nich, Original and German variety – Liryna.

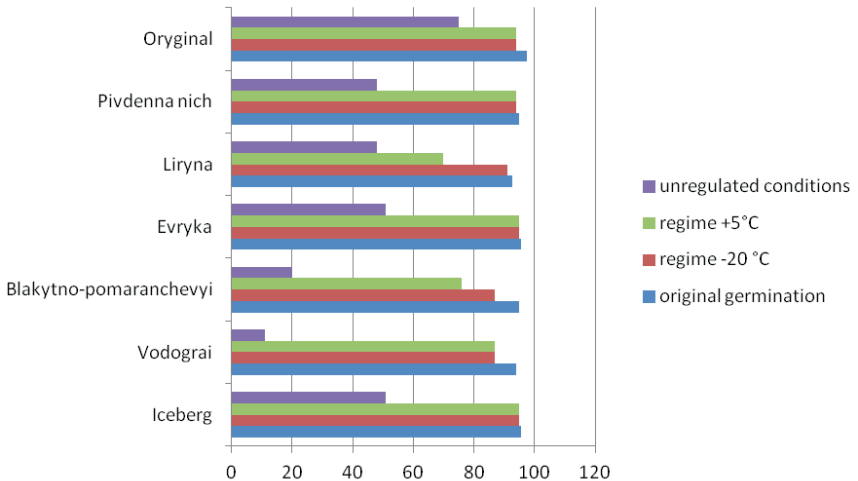
Germination of seeds, which was used for research, was in range 93 – 98%. Seed moisture – is 6.2 – 7.6%. The seeds were stored in three temperature regimes – + 5 ° C, –20 ° C and unregulated conditions (room temperature). The term of storage is 1.5 years. Germination was checked after 1 year and 1.5 years from the moment of laying on storage.

The seeds were germinated in Petri dishes in a climatostat of brand KS-200 SPU at a temperature + 20 ° C. Repetition of the experiment is quadruple. Counting of germinated seeds was carried out on 7th day.

Results of research. When seeds were germinated after a year of storage, the temperature regimes + 5 ° C and –20 ° C showed similar results, difference between them was not significant, and values close to the original germination of seeds. Separately can be noted variety Liryna, which showed a sharp decreasing of seeds germination. So at an initial germination 98%, after storage at temperature –20 ° C was obtained germination 91%, and at + 5 ° C – 70%.

For the storage in unregulated conditions varieties reacted differently. However, was observed a significant decreasing of germination for all varieties. The best result was showed by variety Original, its germination was 75%. Varieties Iceberg, Evryka, Lyryna, Pivdenna nich had a close indicators of germination – 48 – 51%. Varieties Vodograi and Blakytno-pomaranchevyi had a low germination indexes, close to 20% in storage at unregulated conditions (Pic. 1).

After one and a half years of storage, the same tendency was followed – a slight decrease in germination under temperature regimes + 5 °C and -20 °C, a significant further decrease for storage in unregulated conditions.



Pic. 1. Seed germination of linseed varieties under different storage conditions (time of storage -1 year).

At temperature -20 °C, germination of varieties Iceberg and Pivdenna nich decreased by 1%. Germination of other varieties for a half year of storage has not changed and was the same like at first experiment. Germination of varieties Vodograi, Evryka, Pivdenna nich at the storage with temperature + 5 °C was decreased by 1%, other varieties showed the same results as six months ago. Regarding unregulated conditions, further reduction of germination

was observed, except varieties, which showed the biggest decrease during the preliminary determination – Vodograi and Blakytно-Pomaranchevyi. The germination of these varieties remained at the previous level. The best result was showed by variety Iceberg – germination decrease in half a year of storage – 2%, and in total for 1.5 year – 49%. After a 1.5 year of storage, all studied varieties had germination that did not meet to regulatory requirements.

Conclusions. According to the obtained data, it can be concluded that the temperature regime of storage affects on germination of linseed. The best modes for storage it are -20°C and $+5^{\circ}\text{C}$. With seeds storage in unregulated conditions all varieties showed a sharp decrease of germination which was much lower of regulatory requirements. A significant range of variation in seed germination of linseed varieties indicates the need for further research to determine the factors that cause such decrease of seeds germination.

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Високоякісний посівний матеріал є важливою умовою отримання високих врожаїв та якісної сільськогосподарської продукції. Оскільки насіння зберігається впродовж тривалого

часу, для збереження його довговічності, посівних якостей і урожайних властивостей, необхідно забезпечити ефективну систему його захисту від несприятливих чинників за формування сім'янки, збирання та зберігання насіння. При неправильному зберіганні насіння стрімко втрачає свої посівні якості. Метою дослідження було встановлення довговічності насіння сортів льону олійного за різних температурних режимів зберігання. Встановлено, що за зберігання насіння льону олійного при стабільно низьких позитивних (+5 °C) або від'ємних температурах довговічність насіння зберігається впродовж тривалого періоду. Зберігання в нерегульованих умовах змінних температур призводить до того, що господарська довговічність насіння втрачається за дуже короткий період.

Ключові слова: довговічність насіння, льон олійний, зберігання, схожість, сорт.

Высококачественный посевной материал является важным условием получения высоких урожаев и качественной сельскохозяйственной продукции. Поскольку семена хранятся в течении длительного времени, для сохранения их долговечности, посевных качеств и урожайных свойств, необходимо обеспечить эффективную систему их защиты от неблагоприятных факторов в период формирования семянки, уборки и хранения семян. При неправильном хранении семена стремительно теряют свои посевные качества. Целью исследования было установление долговечности семян сортов льна масличного при различных температурных режимах хранения. Установлено, что хранение семян льна масличного при стабильно низких положительных (+ 5 °C) или отрицательных температурах сохраняет долговечность семян в течение длительного периода. Хранение в нерегулируемых условиях переменных температур приводит к тому, что хозяйственная долговечность семян теряется за очень короткий период.

Ключевые слова: долговечность семян, лен масличный, хранение, всхожесть, сорт

High-quality sowing material is an important condition for obtaining high yields and quality of agricultural products. Since

seeds are stored for a long time, it is necessary to provide an effective system of its protection against adverse factors during achene formation, harvesting and storage of seeds in order to preserve its longevity, sowing qualities and yield properties. In case of incorrect storage, seeds lose their sowing qualities rapidly. The purpose of study was to determine the longevity of seeds different linseed varieties under various temperature regimes of storage. It has been established that storage of linseed seeds at stable low positive (+ 5°C) or negative temperatures, longevity of seeds is maintained for a long period. Storage in unregulated conditions of variable temperatures leads to the fact that economic longevity of seeds is lost in a very short period.

Keywords: *longevity of seeds, linseed, storage, germination, variety.*

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