

# **MODIFICATION EFFECT ON QUALITY AND LONGEVITY OF FIELD CROPS SEEDS**

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Longevity of seeds in scientific aspect means its ability to remain viable for a certain time, so, longevity means lifetime of seeds. It is determined by both biological characteristics of crop and conditions, which develop during seeds storage. There is a lot of information in scientific literature that seeds longevity of particular crop and variety largely depends on growing conditions, harvesting and post-harvest handling, as well as influence of other modifying factors, such as overripe, lodging of plants, damage by microorganisms, physical and other influences. Role of some of them, for example, timing of harvesting and ripening of seeds, is widely reflected in literature, while significance of other factors is only by fragmentary information. In publications is a unanimous opinion about the lower longevity of winter rye seeds compare with wheat.

The **purpose of research** was to study modification impact (weather conditions, species peculiarities, terms and methods of harvesting) on quality and longevity of seeds of winter grain crops.

**Materials and methods of research.** As material for perennial (2006–2016) laboratory experiment was seeds of winter crops, grown in the stationary experiment of Plant Science Department in the fields of Agronomic Experimental Station of NULES of Ukraine. seeds of winter rye variety Siverske and winter wheat variety Poliska 90 of harvests 2006 and 2007 were harvested in various phases of ripeness, manually and mechanized, dried to a moisture content 13 %, stored in an airtight container at low air temperature (+ 5 °C) in conditions of laboratory "Quality of seeds and planting material" of Plant Science Department of NULES of Ukraine. Every year, average samples of seeds were taken from batches for determination their sowing qualities according to the current methods of State Standard of Ukraine 4138–2002.

**Results and its discussion.** Our comparative analysis of the long-term 10-years storage of seeds of various species showed a significant difference in preservation of sowing qualities depending on chemical composition. Differences in stability of seeds of winter wheat and rye in the first year of storage were insignificant. Average decreasing of germination of wheat seeds in the second year of storage was 0,7 % with a favorable year for its formation and 1,7 % with an unfavorable one. In winter rye seeds, decline reached 1,2 and 2,5 %. Difference in reducing of germination between crops increased gradually and became significant only after 6–7 years, with its value in range 70–80 %.

In determining economic longevity it is impossible to draw an unequivocal conclusion about badly preservation of rye seeds. In 2007, which is favorable for ripening conditions, seeds of rye and wheat has a similar, almost the same, and a sufficiently long period of economic longevity. It retained conditional germination about four years. However, further its decline in rye seeds occurred noticeably faster than in wheat. Seeds of winter wheat, obtained in less favorable years, have a certain advantage during storage. So, winter rye seeds collected in 2006 (very dry and cold June and July – amount of precipitation in these months was by 84 and 35 % less than a multiyear average for this period) quickly lose their germination and, accordingly, longevity. Reducing of seed quality is explained by increased injury, a significant increase of microorganisms negative impact, especially mold fungi.

Depending on ripening phase of crops, in which seeds were harvested, wax ripeness was a better for winter crops. Analysis of results, obtained by us does not allow us to unambiguously characterize properties and longevity of seeds of early harvesting periods (milky ripeness). It was revealed, that early harvest of winter cereals cause a shortage of dry matter in terms of 1000 seeds and a more significant deterioration in their quality during storage. Significant differences in germination of winter rye seeds of milky ripeness with shortage by 10–15 % of dry matter mass compared to seeds of wax ripeness are traced over next 4–8 years of storage, depending on weather conditions in the year of growing.

It is noteworthy that seeds of very early harvesting periods have the highest germination rate 96–98 %. But since it is less longevous, there is reason to argue that the most important indicator of seed sowing qualities – a high level of germination – does not always characterize longevity of its storage. After ripening and overripening seeds of winter wheat and rye, although has relatively high germination (86 and 84 %) and quite satisfactory storage stability, it turned out was less longevous than seeds, collected in the wax ripening phase. Laboratory germination of such seeds significantly decreased from the first years of storage and on 10th year of analysis was lost by 98 % in winter wheat and by 100 % in winter rye.

We have investigated biological longevity of seeds of various species, depending on harvesting method of crops and their long-term storage. It has been established that harvesting of seeds after mechanized harvesting is much lower, and initial rate of germination loss is slightly higher, than seed samples after manual threshing. The difference in germination loss is grows gradually and reaches the highest value in 6–8 years. The highest difference in reduction of germination of wheat and rye seeds with manual and mechanized collection is 11–15 %. Seeds of winter crops after manual and mechanized harvesting lose their longevity almost simultaneously, after 8–10 years for rye and in 1–2 years later for wheat (with this storage mode). As result, biological longevity of seeds of the same type, regardless on method of collection, is approximately the same. Mechanized harvesting increases percentage of injured seeds and reduces initial seeds germination. During the long-term storage of such seed samples, germination of winter rye seeds at 8th year is reduced by 60 %, at 10th year by 85 %, and winter wheat by 22 and 63 %. Due to the complex effects of injury during harvesting and further development of pathogens, economic longevity of seeds harvested by combine is almost halved from 5–6 to 2,5–3 years for rye, and from about 7 to 3–4 years for wheat.