

IMPROVEMENT OF POST-HARVEST FLAX PROCESSING TECHNOLOGIES

D.Kh. Bozorov

N.K. Majidova

Bukhara State Technical University

Abstract

In the new millennium, the issue of organizing rational, preventive, and, when necessary, therapeutic nutrition for the population is relevant for many countries. Among the crops that contribute to solving this issue, flax occupies a special place – an amazing crop that surpasses other cereals and legumes in protein content and, especially, fat. More than 10 types of products for the confectionery, food, feed, and other industries are produced from flax.

The high content of fat and protein requires special attention to the technology of its post-harvest processing. Therefore, flax coming from the fields must be cleaned and dried during the intake process to prevent quality deterioration during storage.

In Uzbekistan, as elsewhere, fiber flax grows best in regions with good sunlight and a moderate climate, where it can be successfully cultivated as an agricultural crop. In addition, Uzbek farmers typically harvest flax seeds at full ripeness, usually in August-September. Flax in Uzbekistan is mainly grown in the Fergana, Khorezm, and Tashkent regions. The objects of the study were samples of flax batches from the Tashkent region.

The quality analysis of the studied flax batches from the Tashkent region showed that moisture content ranged from 12.0 to 18.5%, and weed impurities accounted for 2.5 to 8.0%. The studies established that the efficiency of impurity removal during flax cleaning was significantly lower than the regulated standards. At the same time, the cleaning efficiency on the R3-MOS vibrocentrifugal separator was somewhat higher than on the F1-BCS-50 separator.

The dimensional characteristics of flax entering processing facilities were studied. Analysis of the contamination of flax samples grown in the Tashkent region showed that the average impurity content was 20.66%, including 7.74% weed

impurities and 22.92% oil impurities (mainly due to broken and shriveled seeds). Additionally, the weed impurities included particles of mineral and organic origin, as well as seeds of weed plants.

The average sizes of flax seeds and the seeds of weeds present in the batches were determined. Thus, the analysis of variation curves allowed a qualitative assessment of which machines (separators, triers) should be used for flax cleaning and which sieves to recommend for this purpose.

It is possible to quantitatively predict the efficiency of flax cleaning from various impurities without constructing variation curves and determine the proportion of removed impurities by using the statistical characteristics of their sizes with the help of the transgression coefficient.

It was found that in the studied flax batches, by length or width, it is practically possible (99–100%) to separate field mustard, ambrosia, and foxtail. By thickness, it is practically possible to separate all considered impurities except cocklebur.

Another important and most energy-intensive technological process in flax post-harvest processing is the drying process. Drying flax is necessary to prevent fiber damage and ensure its long-term storage. Improvements in drying include: the use of more efficient drying units that allow quick and uniform drying of flax, as well as the development of technologies that reduce moisture loss in flax during drying.

For this purpose, we studied the kinetic patterns of flax drying under various process parameters in conditions close to industrial grain dryers. The factors determining flax drying kinetics included the initial moisture content (ω_e), air humidity (0_o), and drying agent temperature (t). The layer thickness and drying agent speed corresponded to conditions in the most common shaft grain dryers of the DSP type.

The description of flax drying kinetics was carried out using the equation proposed by Z.Sh. Burchuladze, V.D. Skverchak, and V.I. Syroedov.

$$\omega = \omega_o + (\omega_e - \omega_o) \exp(-b\tau^n)$$

After processing and summarizing the experimental data using regression analysis methods, we obtained dependencies for the kinetic coefficients **b** and **n** on the factors ω_e , 0_o , and t , which adequately describe the experimental data on drying kinetics.

In the same series of experiments, the heating patterns of flax during its drying in a dense layer were studied. To smooth the obtained experimental data on seed heating, an equation of the following form was used:

$$O = O_e + \tau / (A + B\tau)$$

After summarizing the data on the heating kinetics, regression equations were obtained for the dependencies of the coefficients **A** and **B** on the factors ω_0 , O_0 , and t , which made it possible to adequately describe the experimental patterns of flax heating kinetics under the conditions of shaft-type grain dryers.

A combined analysis of the kinetic patterns of flax drying and heating, supplemented by heat and moisture balance equations taking into account the structurally defined parameters of grain dryers, allowed the determination of stepwise drying modes that ensure the required quality of flax.

Overall, the improvement of post-harvest flax processing is aimed at increasing production efficiency and quality, as well as reducing losses during processing and storage.

References

1. Baskakov Ivan Vasilievich. *Improvement of Technology for Post-Harvest Processing and Storage of Grain Material*. Dissertation.
2. V.G. Shcherbakov. *Chemistry and Biochemistry of Oilseed Processing*. Textbook.
3. Кимсанбаев Х. Х., Жумаев Р. А. К вопросу размножения *Trichogramma evanescens* для биологической защиты растений //Международна научна школа" Парадигма". Лято-2015. – 2015. – С. 34-41.
4. Жумаев Р. А. Биологическая трихограммная *in vitro* усиленная устириш технология. Трихограммная сунный озикада устириш курси (1)(Hymenoptera: Trichogrammatidae). – 2016.
5. Sulaymonov B. A. et al. Effectiveness of Application of Parasitic Entomophages against Plant Bits in Vegetable Agrobiotensinosis //Solid State Technology. – 2020. – Т. 63. – №. 4. – С. 355-363.

6. Kimsanbaev X. X., Jumaev R. A., Abduvosiqova L. A. Determination Of Effective Parasite-Entomofag Species In The Management Of The Number Of Family Representatives In Pieridae //The American Journal of Agriculture and Biomedical Engineering. – 2021. – Т. 3. – №. 06. – С. 135-143.
7. Jumaev R. Invitro rearing of parasitoids //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 371.
8. Кимсанбаев Х. Х. и др. Биоценозда ўсимлик зараркунандалари паразит энтомофаглари ривожланиши. « //O'zbekiston» НМИУ,–Тошкент. – 2016.
9. Сулаймонов Б. А. и др. Ўрмон биоценозида фитофаг турлари ва улар микдори бошқариш //O'zbekiston» НМИУ,–Тошкент. – 2018.
10. Jumaev R., Rakhimova A. Analysis of scientific research on reproduction of species of Trichograms in Biolaboratory //The American Journal of Agriculture and Biomedical Engineering. – 2020. – Т. 2. – №. 08. – С. 148-152.
11. Axmatovich J. R. In vitro rearing of trichogramma (Hymenoptera: Trichogrammatidae) //European science review. – 2016. – №. 9-10. – С. 11-13.
12. Jumaev R. A. et al. The technology of rearing Braconidae in vitro in biolaboratory //European Science Review. – 2017. – №. 3-4. – С. 3-5.
13. Жумаев Р. А. Массовое размножение трихограммы на яйцах хлопковой совки в условиях биологической лаборатории и ее применение в агробиоценозах //Халқаро илмий-амалий конференция “Ўзбекистон мева-сабзавот маҳсулотларининг устунлиги” мақолалар тўплами. Тошкент. – 2016. – С. 193-196.
14. Жумаев Р. А. Значение представителей семейства BRACONIDAE в регулировании численности совок в агробиоценозах //ЎзМУ Хабарлари. – 2017. – Т. 3. – №. 1.
15. Жумаев Р. А. РАЗМНОЖЕНИЯ ИН ВИТРО BACON HABETOR SAY И BRACON GREENI ASHMEAD //Актуальные проблемы современной науки. – 2017. – №. 3. – С. 215-218.



16. Axmatovich J. R. In Vitro Rearing of Parasitoids (Hymenoptera: Trichogrammatidae and Braconidae) // Texas Journal of Agriculture and Biological Sciences. – 2022. – T. 4. – C. 33-37.
17. Suleymanov B. A., Jumaev R. A., Abduvosiqova L. A. Lepidoptera Found In Cabbage Agrobiocenosis The Dominant Types Of Representatives Of The Category Are Bioecology // The American Journal of Agriculture and Biomedical Engineering. – 2021. – T. 3. – №. 06. – C. 125-134.