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STORING PROPERTIES OF HIGH OIL SUNFLOWER SEEDS AND MODERN METHODS OF THEIR PROCESSING

An increase of the fat content in the newly developed sunflower varieties has changed their physical, physiological, biological and chemical properties and their chemical composition.

High oil sunflower seed kernels have had a greater proportion of poly-unsaturated fatty acids, water soluble and easily mobile substances and protein. There are more lignin, mobile carbohydrates, total nitrogen, ash, lipides and less cellulose in the husks. The husk itself has become thinner, its mechanical strength having decreased and its fragility increased. Hydrophily and hygroscopicity of sunflower seeds have grown and their critical moisture level reduced to 6-7%.

That is why high oil sunflower seeds represent an ideal medium for the development and living activity of micro-organisms and predators (insects and mites) which provoce undesirable biochemical processes and may cause total deterioration of seeds and make them unfit to be used as food.

When storing seeds of high oil varieties it is therefore necessary to create conditions preventing intensive metabolic processes in them and protecting them against the effect of the biotic environment.

The greater part of losses in high oil seeds during storage is due to respiration, whose intensity is nearly double that in low oil seeds. Losses of dry matter due to respiration alone during the storage of high oil sunflower seeds at the temperature of 20°C and with the moisture of 9% amount to 70 kg per 1000 tons of seeds. Dry matter losses and quality deterioration depend on the rate of infection by micro-

organisms, particularly by fungi of the genus Aspergillus and Penicillium.

The most active development of mould is observed during sunflower storage at increased temperatures and at the moisture levels above critical. After 8 months of storing sunflower with the moisture level of 6.5% at 18-20°C the rate of infection with "storing mould" increased 1.5-2 times, whereas similar alterations were observed in seeds with 9% moisture after 8 days, and with 11% already after 3 days of storing.

Following the development of toxic strains Aspergillus flavus in the seeds an accumulation of aflatoxines is quite possible. Intact seeds show certain resistance to aflatoxines development as compared to traumatized seeds.

The studies have shown substantial differences during physiologic, biochemical and micro-biological processes in the course of storage, when moisture levels are within critical limits (6 - 7.0%) and over, at temporary and long term storage.

The acid number increase in sunflower seeds with 7% of moisture was 1 mg/KOH after 3 months of storage at 20°C and the total content of oxidation products increased by 0.4-0.6%, while in the seeds with 9% of moisture similar changes in the lipide fraction were observed after 10 days of storage under the same conditions. The quantity of biologically active linoleic acid reduced by 1.6 and 2.5%, respectively.

Along with changes in the physiological and biochemical properties of high oil sunflower seeds the last decade has seen considerable changes in the organization of harvest and preparation of sunflower for selling to state organizations. State and collective farms have got new highly productive machinery, and new methods of cultivation have been developed, all of which allowed to conduct state purcha-

ses in short terms. As a result, storing enterprises often receive during 10-15 days over 20,000 tons of harvested sunflower seeds of high oil varieties unstable in storage.

Deterioration of seeds quality is even observed at short storage on barnyards at state and collective farms. The storing ability of harvested seeds is also affected by the initial state of the most fragile lipide complex and by weeds and impurities.

Considering the afore-mentioned properties of high oil sunflower seeds in storage, state purchases of sunflower seeds are conducted according to schedules accepted by storing enterprises and state and collective farms aimed at the round-the-clock operation of the former. This pattern of work is followed everywhere, particularly in the Krasnodar Territory.

The need to regulate sunflower seed purchases is realized in other countries too, as was evidenced by the report of Mr. Pietryk from Canada.

Active physiological biochemical and microbiological processes taking place in freshly harvested high oil sunflower seeds necessitate a development of new technological means of after-harvesting processing. According to the technological scheme, the quality evaluation and weighing of seeds must be followed by cleaning.

Seed lots under 8% of moisture should be stored in warehouses and bins provided with means of active ventilation to dry and cool the seeds.

At the moisture levels of 8-10% an over, seeds must be dried in driers of the well, recycle and pneumo-gazeous types with subsequent cooling.

If necessary, second cleaning of seeds is effected after drying.

During the period of sunflower intensive procurement is impossible to dry all lots of freshly harvested seeds, and part of seeds is

therefore cooled or fumigated with CCl_3NO_2 or CH_3Br, later on to be dried to 7% moisture level.

For long term storage seeds of high oil sunflower varieties should be cooled to at least 10°C.

Availability of separators having the productivity of about 80-100 t/h, well, pneumo-gazeous and recycle driers, storing compartments and bins provided with means of active ventilation and refrigerators allow cleaning, drying and cooling all lots of freshly harvested sunflower seeds.

Introduction of the afore-mentioned machinery in the purchasing enterprises of the Krasnodar Territory made it possible to maintain the quality of seeds and to produce sunflower oil of the first and extra quality grades in 1975.