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SEED PROCESSING PECULIARITIES OF NEW SUNFLOWER VARIETIES

Regionalized and newly released high oil sunflower varieties essentially differ from former mean oil containing varieties in many characteristics and, which is most important for the oil-and-fat industry, in technological properties influencing the seeds' condition during storage and processing.

Our results on changes in the acid number of oil in seeds under storage suggest that the dependence of the acid number on the storage time is almost linear. Thus, the storage ability of seeds can be characterized by a tangent of incidence of these lines, that is, by the rate of increase of acid number in the seeds. In the studied samples it was from 0.09 to 0.47 mg KOH/month. The rate is influenced by many factors, including varietal differences. In the variety Armavirsky 3497 the rate was 0.24-0.22 and in VNIIMK 6540 Improved it was 0.12 mg KOH/month.

Stored high oil sunflower seeds are also influenced by the pressure in the mass of seeds caused by the weight of the above layers of seeds. The maximum value of the static pressure in the silo bins with the diameter of 6 m and the height of 30 m, with sunflower seeds stored in them, was found to be from 1.0 to 1.2 kg/sq.cm. Table 1 presents data of experiments with a laboratory equipment to study pressure influence on quality of seed of sunflower variety Smena with the oil content of 49.1% moisture level 6.9% and 1.5% impurities. Pressure influence was confirmed under industrial conditions too. The oil acid number of seeds stored during 5 months in industrial silo bins showed 0.3 mg KOH more than in seeds stored in warehouses with the depth of the layer being 3.5 - 5.0 m.

Table 1

Pressure Influence in Seed Mass on the Increase of Acid Number (mg KOH)

Pressure in the seed mass kg/sq.cm	Storage time, months			
	1.5	3.5	5.5	6.9
0	1,28	1,39	-	-
0,20	1,27	1,40	1,44	1,49
0,45	1,32	1,48	1,56	1,65
0,70	1,49	1,60	-	1,64
0,88	1,68	2,02	-	-

Experimental processing of the seed of new varieties with 20% huskness showed a poor separation of the husk under present technological conditions. Processing of low husk varieties with 16% huskness probably will require the development of new means of separation. High wax content in the hull and their inclusion into oil during processing necessitate a special operation of wax elimination from oil.

Thus, some technological properties of sunflower seeds have to be considered by breeders when breeding new varieties and by processors when improving processing methods.

These new technological methods are the increase of uniformity of seeds, seed fractionation before storage and after-harvest maturation of seed under optimal conditions.

Moisture ununiformity of seeds and its influ nce on storing ability of the seed were studied in an experiment the results of which are given in Table 2. In this experiment seeds were used with the oil content of 49.6-50.7%, impurities 2.1-2.3%, and defective seeds percentage 3.0-5%. Seeds were stored in silo bins of 6 m in diameter 30 m in layer height. When storing seeds with 7.1% moisture and mean square deviation of moisture 0.47% and with 7.6% moisture and mean square deviation 0.28%, after a month of storing the seed temperature increased from 20°C to 40°C and higher, self-heating spots were observed, and seeds were taken off storing and processed. Seeds with lower moisture content and higher uniformity were stored during 10 months. This experiment illustrates the influence of moisture ununiformity of seeds on their storing ability. One should bear in mind that the mean square deviation 1.55% corresponds to the natural diversity of seeds in heads by the time of harvest.

The increase of seed uniformity may be reached by special operations or along with usual technological operations. For example, during seed fractionation in one of the experiments the mean square deviation in moisture was reduced from 0.52 to 0.31%. The main objective of fractionation before storage is however to screen immature seeds with poor storing ability.

The useful effect of the afterharvest maturation is well known, but in our view its potentialities have not been fully revealed. We have shown the possibility of reducing the acid number of the seeds by 0.4 mg/KOH. In our experiments we have used freshly harvested mature seeds with moisture content of 12-14% and dried to 6.5-7.0% several hours after combine harvesting. We consider such acid number reduction to be far from the limit and in the case of after-harvest maturation under optimal conditions this effect may be more pronounced, thus allowing the exclusion of such an operation during refining as the elimination of fatty acids by neutralization or by other means.

As follows from the data obtained, it is

Table 2

The Effect of Un-uniformity of Seeds in Moisture Content, on the Rate of Increase of Acid Number in the Seeds (mg/KOH/month) During Storage

Mean weighed moisture, %	Mean square deviation of moisture, %		
	0,28-0,30	0,47-0,51	1,55
6,1	0,10	0,12	
6,3	0,12		
6,5	0,15	0,47	
7,1	0,20	0,55	
7,7	0,35		0,69

difficult to attain the prevalence of the processes of synthesis over hydrolytic processes for the fraction of immature seeds during the after-harvest maturation. Our experiments have shown that following this after-harvest maturation the oil content increases by 0.5-1.0%.