POSTHARVEST OPERATIONS AND QUALITY OF RAPESEED

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ABSTRACT

The investigation was made in order to find sources and reasons of quality losses in typical postharvest handling of rape. Samples were taken before and after succeeding operations to estimate the influence of each of them on physical state of seeds. Evaluation of damage was made according to methods elaborated in the Institute of Agrophysics, which allow to evaluate the amount of micro and macro damage as well as the amount of foreign material. Harvesting acted the most negatively and the level of damage noticed after harvesting decided about the amount of damaged seeds at the end of postharvest operations.

INTRODUCTION

Seeds undergo various external loads while they are drying, cleaning, conveying and storing. Forces acting during these operations cause damage to seed, what results in worse quality of raw material for oil production.

The present study monitored changes in level of rapeseed damage from harvest operation till storing of seed before oil production. The described process was typical for polish circumstances and reffered to typical machines and apparatus used in Poland for preparation of seed to storage or production. The aim was also to find operations and/or machines acted the most negatively on quality features of rapeseed.

MATERIAL AND METHODS

Investigations were made during 1994 "harvest seasons" in BOLMAR factory - the biggest oil producer in soth-east Poland. Rapesed came from state and private farms and it was submitted right after harvesting. All other operations were made in BOLMAR factory and were under investigation. The basic samples (primary) represented physical state of rape after harvesting and were colected from trailors before unloading. The succeede operations of postharvest technological process of rapeseed are presented on the Figure 1.

This process was divided into five stages: unloading, cleaning, storage of wet

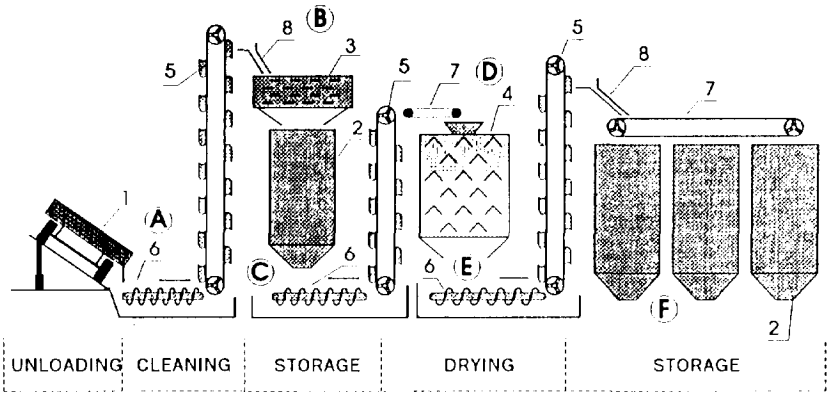

Figure 1. Postharvest rapeseed technological process: A-F - sampling places
1-tippler, 2-silos, 3-cleaner, 4-dryer, 5-bucket elevator, 6-screw conveyer, 7-belt conveyer, 8-chute

rapeseed, drying and storage of dry rapeseed. Between stages seeds were conveyed using various types of conveyers: screw, belt, Redler, chute and buckets elevators. Unloading was performed on tippler, seeds were poured in the charging hopper of the srew conveyor. It conveyed rape to the buckets elevator, which lifted it to the slide pipe and than to the sieve cleaner. But it was only rough separation of rapeseed from pieces of straw, pods, stones, grains of other cereals etc. Wet rape was stored in silo and during the same day was dried. Vertical continuous drying stove was used, where hot air was a drying factor. The temperature of air at dryer's entrance was 110-130°C. Dry rapeseed was stored in silos till oil production.

Samples for investigations were colected before and after each operation (A-F - sampling places). Samples were taken every 15 minutes within 5 hours a day. Investigations were started at July 26-th. and stopped at August 1-st. On the whole there was 140 samples colected. All samples were taken from a moving stream of rapeseed, considering accessibility of the sampling places. After colecting, samples were taken to the laboratory in order to check moisture content and their quality parameters. Before studing quality features, all samples were kept open till they achieve air-dry moisture content (6 - 7% w.b.).

The following quality features were investigated: amount of macrodamage, amount of microdamage and amount of foreign material (pieces of straw, pods, grains of wheat and weeds etc.). Macrodamage (broken pieces of cotyledons and skins as well as seeds with visibly broken skin) and foreign material were expressed as a weight percentage of air dry matter and were separated from rapeseed. From the rest of seeds 10 subsamples with 100 seeds in each was put on wet filter paper and kept for 2 hours. Seed swelled and microcracks of skin could be seen. The amount of microdamage was expressed in percents as number of seeds (from 100).

RESULTS

Moisture content of rape delivered to the factory was 9 till 14%. Such a low moisture was observed because of very dry and hot weather before and during harvesting. In the most of cases seed required only sleight drying (drying up) which was conducted correctly and the final moisture content of seed was from 5 till 6%.

The amount of foreign material generally decreased during the whole investigated process, however statistical differences were insignificant (Fig.2). It should be stated that the biggest decrease of this fraction was noticed during cleaning (from 3.7 to 2.9% in average), but even this difference was insignificant.

The differences between macrodamage in succeeded operations were insignificant, but the tendency to the increase was observed (Fig. 3). An average amount of macrodamage after harvesting was 5.3% and it increased till 6.1% after drying. The slight increase of macrodamage level (0.8%) was noticed during cleaning and drying, while during transport this level decreased (0.3%).

The level of microdamages increased at the begining of the process and during

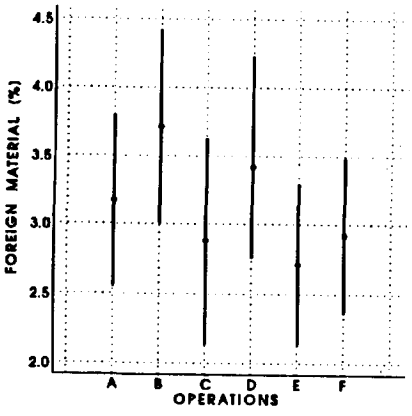

Fig.2. The amount of foreign material during postharvest operations

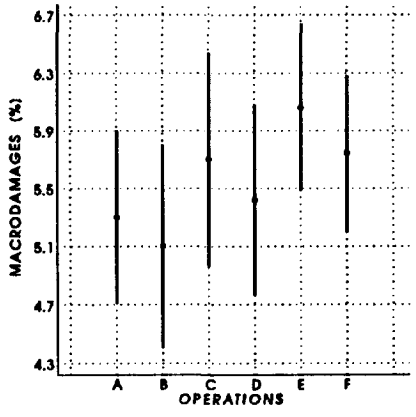

Fig.3. The amount of macrodamages during postharvest operations

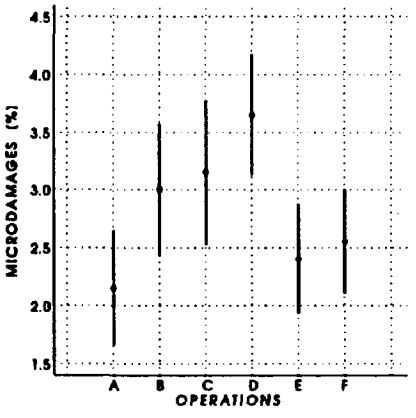

Fig.4. The amount of microdamages during postharvest operations

drying rapidly decreased (Fig. 4). The smallest number of microdamages was noticed in samples after harvesting (2.2%) and they increased in each transport operation and during cleaning (insignificant difference) till 3.7% before drying. Then the difference was significant (1.3%) and the level of microdamage was in average 2.4% till storing in silo.

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