

## EFFECT OF MOISTURE AND DAMAGE ON ACTIVITY OF LIPOLYTIC ENZYMES IN STORED RAPESEEDS

J. GRABSKA, L. JEDRYCHOWSKI, M. PISKULA

Centre for Agrotechnology &amp; Veterinary Sciences PAN, 10 Tuwima Street, 10-718 Olsztyn, Poland.

## ABSTRACT

Technological quality of rapeseeds stored (Bolko and Ceres var.) was determined on the basis of changes in lipolytic activity, acid value and peroxid value of the oil. Changes in the seeds quality were highly significantly correlated with the degree of their damage and moisture level.

## INTRODUCTION

Damages of rapeseeds cells during harvest, transport and other operations related with their processing result in activation of proteolytic, lipolytic, oxido-reductional enzymes and myrosinase. During storage of seeds the enzymes may cause considerable quality changes especially at exceeded limiting value for seed moisture. Disadvantageous changes may be highly intensified in the presence of microorganisms at large microbiological contamination of seeds.

The aim of the study was to determine the effect of mechanical damages of rapeseeds and level of their moisture on the activity of lipolytic enzymes as well as to determine the levels of these parameters at which there are no changes lowering the technological quality of stored seeds.

## EXPERIMENTAL

## Materials and Methods

In the first part of experiment Bolko and Ceres rapeseeds of two damage degrees were investigated:

Bolko - lower damage degree 1.4% (0.7% macro- and 0.7% microdamages); higher damage degree 1.9% (1.6% macro- and 0.3% microdamages);

Ceres - lower damage degree 1.7% (1.7% macro- and 0.0% microdamages); higher damage degree 3.9% (2.2% macro- and 1.7% microdamages).

The seeds were moistured to 10, 13, 16 and 19% and stored for 2-3 weeks at about 18°C at relative air moisture 70%.

In the second part of experiment Bolko rapeseeds of various damage degree (0, 5, 10, 15, and 20%) and moisture (6, 10, 14 and 18%) were stored for 4 weeks to 6 months.

During storage lipolytic activity of enzymes was controlled in the seeds with the diffusion method acc. to Lawrence (Lawrence R.C., Fryer T.F., Reiter B., 1967). Lipolytic activity was expressed in activity units A.U. The quality of oil was determined based on acid value and peroxide value. The effect of particular parameters was estimated statistically with three-factor variance analysis.

## RESULTS

Statistical analysis of results of the first part of experiment showed highly significant effect of seed moisture and storage time on lipolytic activity of enzymes in the seeds studied. The relation was particularly clear at high moisture (16 and 19%) where as during 3 weeks of storage of low moisture seeds (10 and 13%) lipolytic activity of enzymes in both Bolko and Ceres rapeseeds changed only slightly (FIG.1, 2). Little diversified damage degree of the seeds did not allow univocal establishing of the effect of this parameter on changes in the activity of lipases in the stored seeds especially for Ceres variety.

Changes in the activity of the enzymes studied were closely related with the growth of general population of microorganisms which resulted in eliminating from further studies the seed samples with 16 and 19% moisture after 2 weeks storage.

In the second part of experiment in the seeds of low moisture (6%) activity of lipolytic enzymes remained at a similar level during the first 4 weeks of storage. After that time it increased the more evident the higher damage degree of the seeds was. Changes in activity were highly significantly related with storage time while degree of seeds damage affected this parameter highly significantly. Similar tendencies in changes were revealed by acid value of the oil obtained from the seeds stored. Increase in acid value of the oil was observed starting from the 4th week of storage and it depended on damage degree of seeds. Oxidation changes expressed by increase in peroxide value of the oil obtained from the seeds began during the 3rd week of storage and were independent on damage degree.

Initially high lipolytic activity of the seeds of 14% moisture remained the same throughout the whole 4-week storage period and did not depend on the damage degree of seeds. Acid value of the oil obtained from the seeds rapidly increased after 7 days of storage and obviously depended on the damage degree of seeds. Drastic changes in oil oxidation were observed after 3 weeks of storage.

The greatest changes in the technological quality were found in the seeds of 18% moisture in which lipolytic activity and acid value markedly increased already after 3 days of storage and were highly significantly dependent on damage degree of seeds.

CONCLUSIONS

The seeds of low moisture (6%), even of high damage degree, can be stored for up to 4 months without detriment to their technological quality. Changes in activity of lipolytic enzymes are highly significantly dependent on storage time and statistically dependent on damage degree of seeds. The storage of such seeds for up to 6 months results in significant oxidation changes in oil the more the higher the seed damage degree is.

The storage of the seeds of high (13-14%) moisture for about 3 weeks does not cause detriment to their quality on condition that they are not damaged.

The storage of the seeds of very high moisture (over 18%) for over 3 days lowers their technological quality related with increase in lipase activity and changes in oil fractions of the seeds.

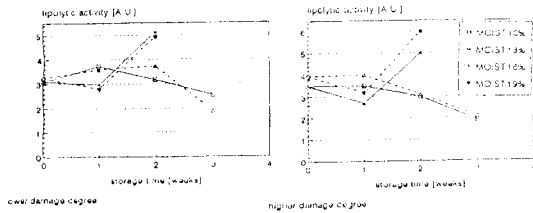


FIG 1 ACTIVITY OF LIPOLYTICAL ENZYMES DURING STORAGE OF RAPESEEDS LOW AND HIGH DAMAGE DEGREE

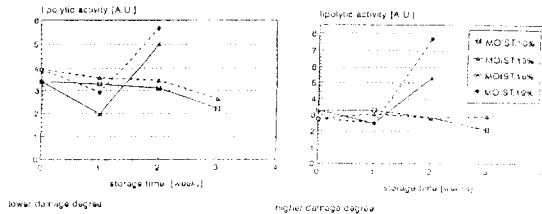


FIG 2 ACTIVITY OF LIPOLYTICAL ENZYMES DURING STORAGE OF RAPESEEDS LOW AND HIGH DAMAGE DEGREE

REFERENCE

Lawrence, R.C., Fryer, T.F., Reiter, B. (1967). Rapid method for the quantitative estimation of microbial lipases. *Nature*, 25, 1264-1265.