

EFFECT OF DRY MILLING CONDITIONS ON THE SEPARABILITY OF WHEAT KERNEL CONSTITUENTS

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Introduction

The valorisation of cereals in non alimentary industries use the development of new separation technology between the different constituents: starch, proteins (constituents of endosperm) and fibers (constituents of bran). In fact, only pure fractions are valorisable in non alimentary industries as chemistry industries.

For the separation and the purification of wheat fractions, we can use two different ways: a dry separation (milling, sieving) or a wet separation.

The possibility of use the wheat kernel as raw material must suppose not only the amelioration of separation of constituents but also the reduction of price production..

At the present time, only the wet treatment can permit to obtain a relatively pure starch fraction. But, this type of separation will become too expensive because of the increase in price of water treatment.

That's why, we decided to set up a program for the optimisation of dry milling of wheat.

In this communication, we present some first works which concern the optimisation of different milling methods.

Milling - Separation

We have considered the milling of wheat by three grinders which are different from the usual cylinders milling.

We can use four types of stress during milling. The stress can be: percussion of a grinding materiel or percussion against a fixed element, compression between a fixed

element and a mobile one, shearing with help of sharp materiel or attrition between rough surfaces.

These types of stress may be combined in one grinder.

In function of intensity and mode of stress, every constituent may have a different comporment during the grinding.

As well as we may separate the constituents in function of their form, their size or their density.

We have made a parametric study with three different grinders to optimise the separation between the principal components of wheat. We have compared these millings with the usual one.

We choose for our study the three following grinders: a millstone, a percussion grinder and a centrifugal grinder.

Results

The fibers and the others components are separated with the usual process. The separation between starch and proteins requires the study of the ground product finer than 200 μm .

We can distinguish different size of populations:

- a fraction constituted by particles superior to 50 μm , which is characterised by aggregates of starch and proteins
- in the second fraction, around 30 μm , we find unblocked starch grain, relatively pure and mixed with proteins
- the last population, around 5 μm , is constituted by unblocked starch grain, with finer size

By selection and using different size cuttings we obtain a different composition.

The incidence of grinding conditions has been compared by the following different physico-chemical approaches:

- grinding kinetic variation of size and the form of the particles
- evolution of the biochemical composition of the population (content of the different components)

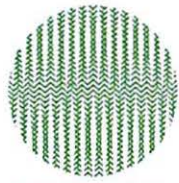
Conclusion

Grinding of wheat by different mode of stress show us different granulometric distributions in the population less than 200 μm .

The proportion of the three observed populations varies in function of the grinding parameters and of type of grinder.

The different modes of applied stress have allowed to obtain flour with different size distribution;

The final results have allowed to define optimal conditions and separation process in accordance with the inquired characteristics.



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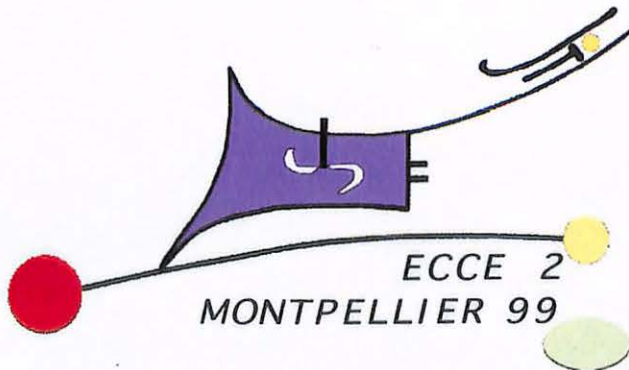
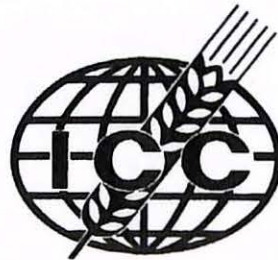
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Workshop on Process Engineering of Cereals



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Programme and Abstracts

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