New process for the purification of the rapeseed hulls

FINANCING

Picardie Innovations Végétales, Enseignements et Recherches Technologiques

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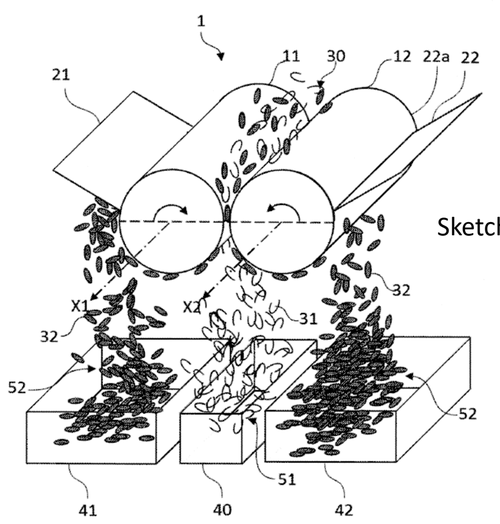
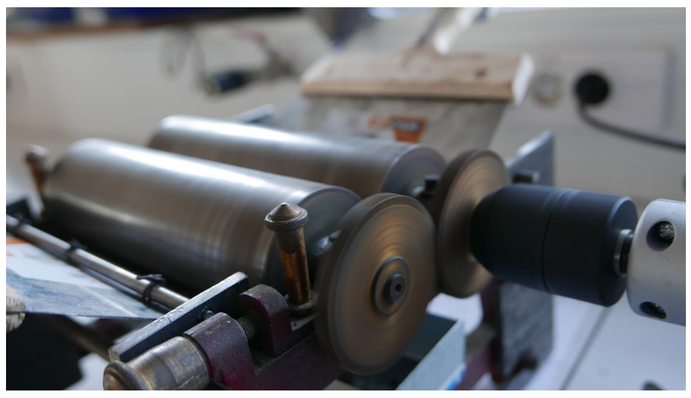
Purity of rapeseed hulls is a critical factor in the mass balance of the dehulling process. In rapeseed germs, the cotyledons are folded in two layers composing the inner and outer cotyledon. In some parts, the thickness of the cotyledons is not larger than the one of the hulls. While dehulling cause the breaking of the germs, this thin material is difficult to separate from the hulls resulting in oil losses during the separation.

Hemispherical shape of outer cotyledons



Sketch of the system

Raw hulls before purification



Picture of the experimental device

Kernel fraction

Purified hulls

The principle of this new method of separation is based on a difference of adherence of the cotyledons and the hulls when compressed on a metal surface. It was observed when broken seeds were flaked that kernels were sticking to the cylinders while the hulls did not adhere. This method exploits this difference in behavior in order to remove the kernels residues found in hulls after a first separation. The experimental device was composed of two counter-rotating cylinders having 65 mm diameter and 200 mm of width which surface was scraped by a thin blade of steel. A container placed below the inter cylinders space was collecting the purified hulls and two containers under each scraper were collecting the kernels removed by the scrapers

Parametric study of the system

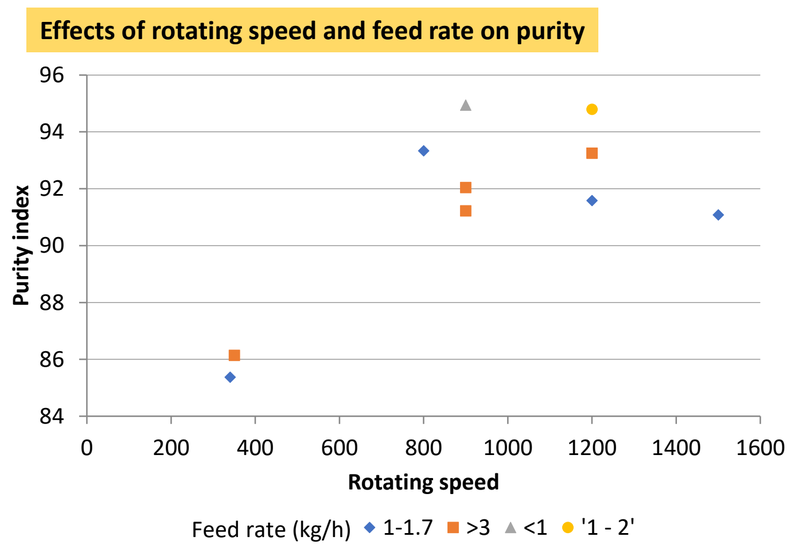
Parameter	Low	Medium	High
Feed rate (kg/h)	1	2-3	>3
Rotating speed (rpm)	~ 350	~ 800	~ 1200
Gap between rolls (mm)	0.1	.	0.2
Moisture	9.6%	.	17.6%

$$\text{Purity index} = [PH_1/TH + (1 - PH_2/TK)] /2 \times 100$$

With :

PH_1: Pure hulls in purified hulls
PH_2: Pure hulls in recovered kernels
TH: Purified hulls
TK: recovered kernels

Effects of rotating speed and feed rate on purity



Results

Gap: 0.2 mm space was too large to obtain the adherence phenomenon of the kernels on the cylinders (poor results).

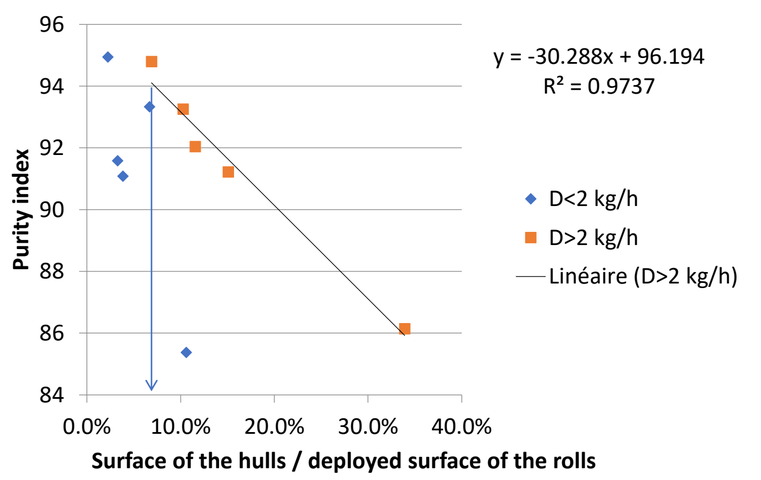
Moisture: moistening the hulls was improving the purity of the hulls but degraded the purity of kernels

Feed-rate & rotating speed

A clear relationship was observed between the feed-rate and the rotating speed. The purity of the fractions was degraded when the deployed surface of the rolls (surface x rotating speed) per unit of hull was reduced.

It means that the probability of superposition of a kernel and a hull was increased. A good delivery system is required to spread the material on the area above the cylinders.

Effects of the ratio surface of the hulls / deployed surface of the rolls



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