

# Evaluation of Non-Food Utilization of Rapeseed Meal

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A research program, led by CETIOM, in collaboration with ONIDOL (the French Organization for Development of Oilseeds), was undertaken two years ago in order to evaluate the non-food utilization of rapeseed meal. The main possible non-food applications for proteins are (Table 1) traditionally bioplastics, coatings, glue and adhesives, paper, emulsifiers. Two strategies have been examined : direct utilization of rapeseed meal as fertilizer and combustion material, processing of rapeseed meal for preparation of biodegradable materials. The aims were to find new outlets for rapeseed meal resulting from set aside and to improve energy balance of biodiesel.

## 1 - Rapeseed meal as fertilizer

These uses concern competitive markets with very low value. So there are needs for rapeseed meals with specific properties and slightly higher value than traditional fertilizer. Rapeseed meal is traditionally used as a fertilizer in China and was used in Japan some years ago. Furthermore, castor meal is presently used in market gardening.

At present, a few references are available (Table 2), the main studies being done by J. Asano (1984), A. Borcherding (1995) and M. Kücke (1993).

Field experiments under controlled conditions were carried out by CETIOM for determining kinetics of nitrogen mineralization for rapeseed meal, optimizing application levels and evaluating effects on quality of some vegetable

crops. This study received a grant from AGRICE (the French Agency for Environment and Energy Management).

The first available results show a fast mineralization of nitrogen (Table 3). The consequence of this could be a too fast growth of rapeseed before winter in case of early seedling and an important risk of leaching during the winter. Possible variations in results could also be due to different granular characteristics of meal.

## 2 - Rapeseed meal as material for combustion

This research, also financed by AGRICE, is being carried out at the Compiègne University of Technology with the development of specific procedures for evaluation of waste incineration. Rapeseed meal in powder or in pellets will be tested in a pilot rotating oven.

## 3 - Rapeseed meal as biodegradable materials

The technical feasibility of biodegradable materials from rapeseed meal (Table 4) is studied by INRA (Institut National de la Recherche Agronomique - Laboratory for Biochemistry and Technology of Proteins). This program includes optimization of extrusion with co-rotative screw applied to non dehulled or dehulled rapeseed meal, with or without additives, with or without other raw material (starch). The mechanical properties of the final products are under investigation.

**Table 1 : Proteins for non-food applications**

Applications	Requirements
* Bioplastics	Biodegradability
* Coatings	Water Resistance
* Glue, adhesives	Film forming resistance Solubility
* Paper	Stabilisation of dispersions viscosity
* Emulsifiers	Stabilisation of emulsions

**Table 2 : Fertilizer value of processed rapeseed meal**

**Main References :**

Asano J., 1984, Effect of manures on quality of vegetables. *JARQ*, vol. 18 n° 1, p. 31-36.

Borcherding A., Luck T., 1995, Evaluation of non-food utilization of by-products of the oil extraction of rapeseed. in : *Proceedings of the 21st World Congress of the ISF*, The Hague, NL.

Kücke M., 1993, Fertilizer value of processed rapeseed meal. in : *Proceedings of the 2nd European Symposium on Industrial Crops*, Pisa, Italy

Kücke M., 1993, The Efficiency of rapeseed oil cake as fertilizer. *Agrobiological Research*, vol. 46, n°3, p. 269-276.

**Table 3 : Rapeseed meal as fertilizer**

**Temporary results (winter rapeseed)**

Fast mineralization of nitrogen

⇒ *Fast growth before winter*

Possible variations due to granular aspect of meal

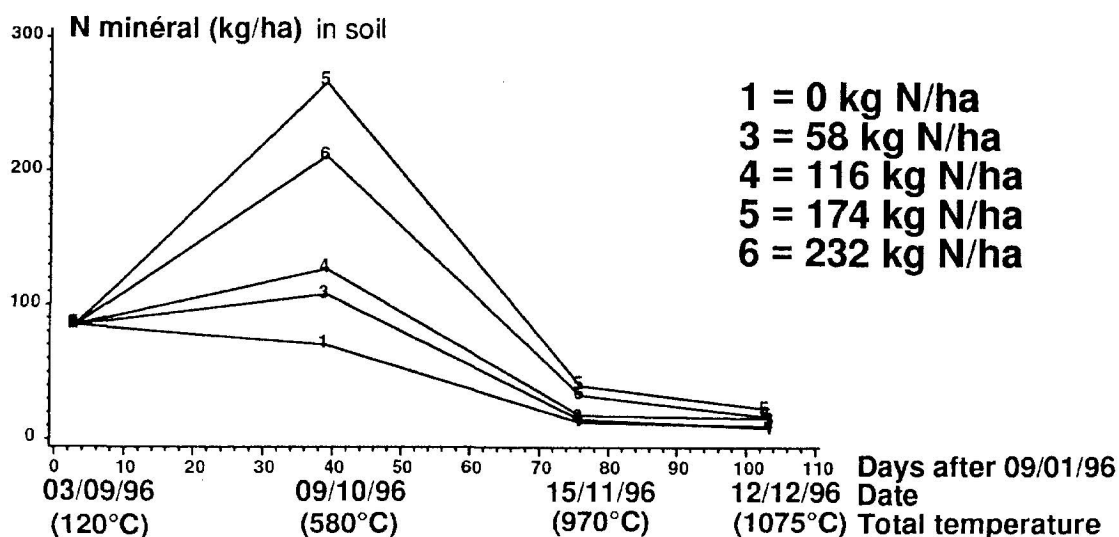


Table 4 : Rapeseed meal as biodegradable material

**INRA (Nantes)**

**Commercial rapeseed meal  
or  
Dehulled rapeseed obtained on a pilot scale**

- Optimization of extrusion with co-rotative screw
- With (reactive extrusion) or without additive
- With or without other raw material (starch)
- RSM content varying between 10 and 75%
- Mechanical properties under investigation