LOW ODOUR & VEGETABLE OFFSET INK FOR FOOD-PACKAGING APPLICATION

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Expertise Corps Gras
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Introduction

- **Context :**

Vegetable inks, where mineral oil is substituted for methyl esters of fatty acids, were born in Northern Europe about five years ago to answer to ecological problems. Vegetable offset inks are still not used in food-packaging due to their diffusion in food; presently mineral inks used in food. Inks used in food-packaging must be inert towards food products and must not give off odour or taste

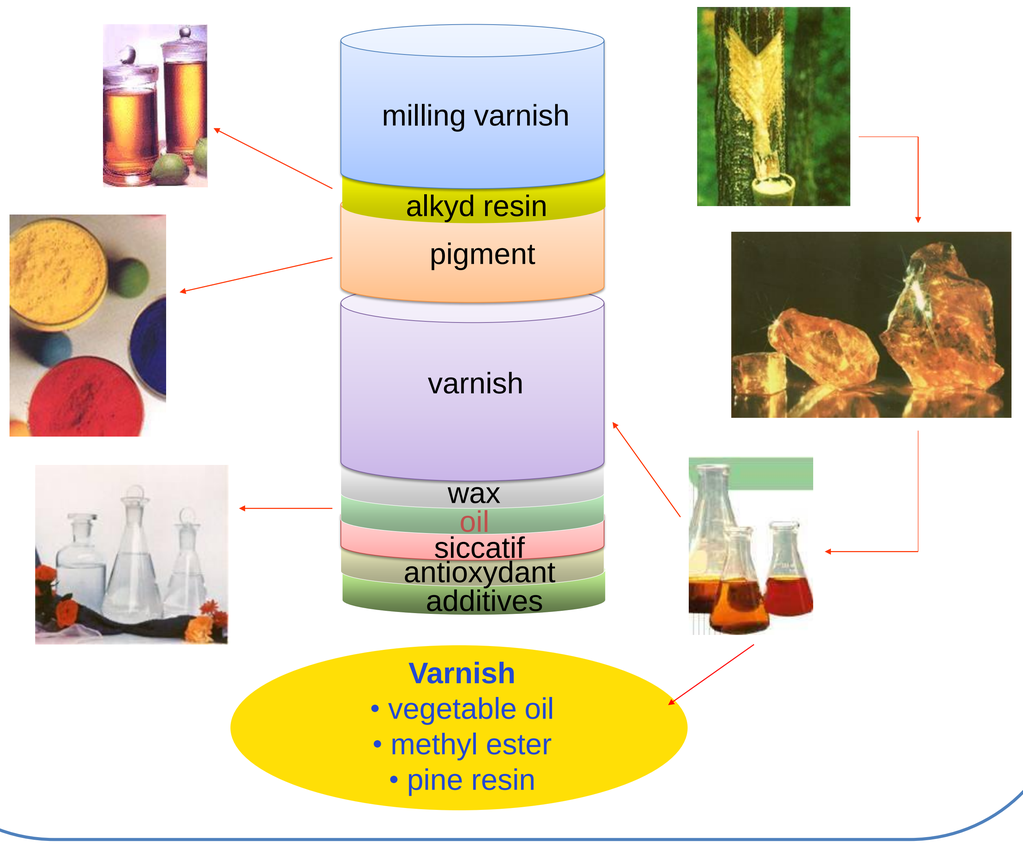
- **Aim :**

The aim of this study is to develop and formulate a “green” ink which respect the environment and answer to the requirements of food-packaging market. Raw material will be selected and the process will be adjust to the synthesis of the varnish until the formulation of the ink.

- **Partners :**

This program is a national project “AGRICE” with the collaboration of
• ADEME (Financial)
• SICPA (Ink producer and end user)
• ITERG (R&D laboratory).

A 100 % vegetable ink formulation

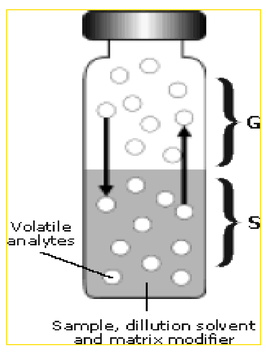


Methods

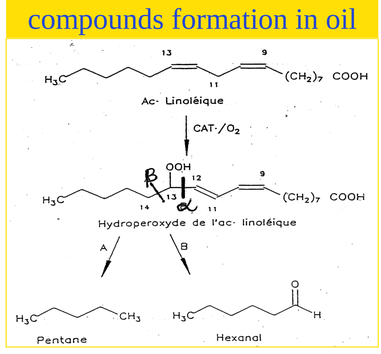
Some oxidative compounds in oil are odorous and can give off odour to the packaging. Head Space, technical analysis, and Robinson Test or Sniff Test, sensorial analysis, give qualitative and quantitative information on the odour.

- **Head Space :**

Analyse of oxidative by- products present in the gas phase, volatile compounds which are odorous.



Example of volatile compounds formation in oil



- **Sensory evaluation :**

• Sniff Test : evaluation of the odour of a packaging or any of its components and its potential transfer to the packaged product.
• Robinson Test : evaluation of spoil of the chocolate taste which is put on a closed vase near a support printed with ink.

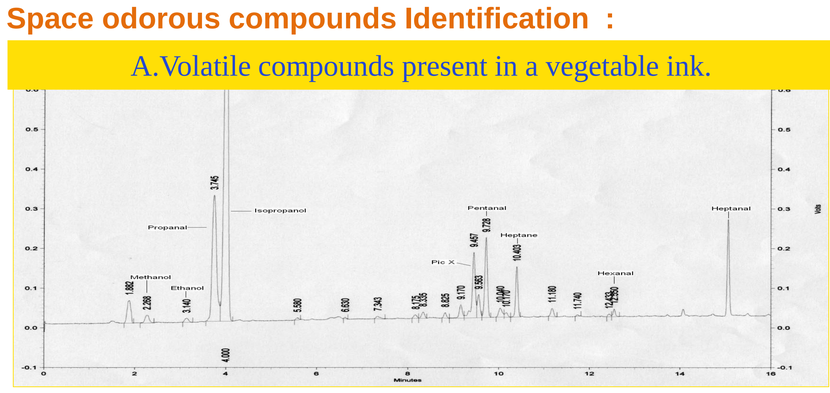
Results

- **Raw materials selection:**

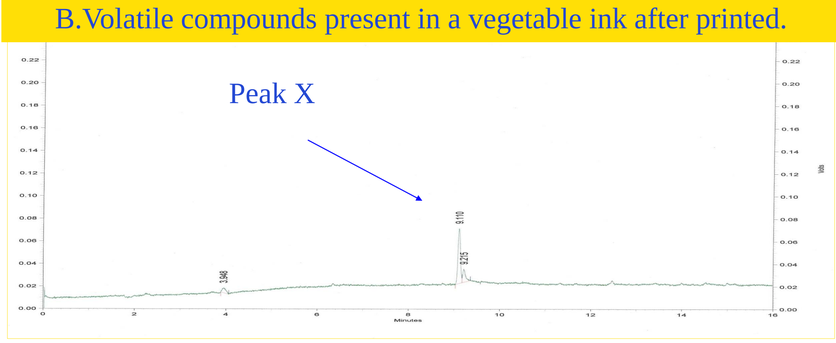
Physical and chemical tests (viscosity, drying time, process temperature...) were carried out to select the raw materials in order to formulate a milling varnish for the production of a 100 % vegetable ink stable and fitting to offset printing .

- **Head Space odorous compounds Identification :**

A. Volatile compounds present in a vegetable ink.



B. Volatile compounds present in a vegetable ink after printed.



The odour problem occurs when food products are in contact with packaging, and therefore with the printed support. The Head Space analysis of the support printed with the vegetable ink shows that all volatile compounds present in the ink (A) evaporate when the ink is printed, with the exception of one compound: the peak X (B). This peak will be the tracer to explicate the level odour in the formulated vegetable inks.

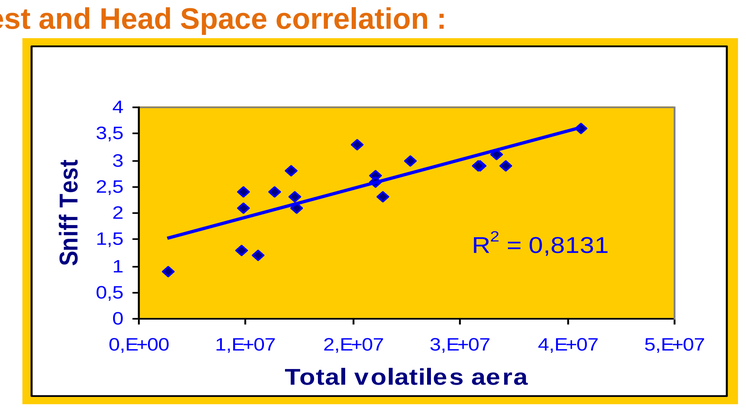
- **Sniff Test results :**

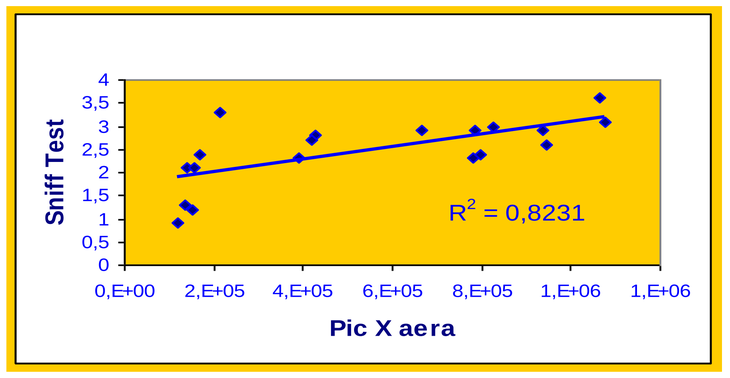
Ink used in food-packaging	Sniff Test
Mineral ink	11
Vegetable Ink*	3,4
Competitor Ink	2
ITERG-SICPA Ink	**0,9**

* not used in food-packaging

The odour level authorised in food-packaging is <1,5, the ITERG-SICPA vegetable ink answer to this requirement.

- **Sniff Test and Head Space correlation :**





The correlation between the odour level (Sniff Test) and the volatile area (Head Space) is interesting. It shows that the presence of volatiles, oxidative compounds of oil and its derivatives, may cause odours in packaging-food. Moreover, the peak X, the tracer, which is present in printed support, could be the principal source of odour.

Conclusion

After selecting raw materials, optimising process and checking physical properties at laboratory, industrial trials of vegetable ink formulation have been carried out on 200 kg and the results on odour and printing are encouraging, SICPA will soon deposit a patent.
This project opens a new way of industrial development of the biomass, the substitution of mineral ink in food-packaging by a vegetable ink will have commercial issue.
The estimated market in Europe is 7 000T/ year. These products will respect the environment by reducing VOC’s emission and using renewable materials.

The 14th European Biomass Conference & Exhibition, Palais des Congrès Paris, France, 17-21 October 2005.