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Low-Cost Rice Bran Stabilising Unit

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GENERAL OUTLOOK ON HEAT STABILIZATION OF RICE BRAN[1/]

by

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Two processes are usually adopted by the authors involved in the stabilisation of rice bran as a useful raw material for the extraction of edible oil for human consumption as well as for obtaining rice bran meal to be used as protein animal feed.

The main aim of several authors is to stop or reduce the activity of the lipase engyme causing the rapid increase in the FFA. Thus inactivation of the lipase in the bran immediately after milling is therefore a key problem in the production of edible rice bran oil.

Heat stabilization of the bran in rural areas with less infrastructures in most of the developing countries calls for a simple low-cost stabiliser that can be adopted by small rice mills.

The design of a suitable small-scale, low-cost rice bran stabiliser should be technically simple, to achieve the following parameters :

1- lowest possible stabilising temperature
2- shortest possible effective stabilising time
3- the optimum residual moisture content, that does not affect the keeping quality of heat-stabilised bran

How to choose the required Stabilizer

The proposals for a certain type of stabilizer should be based on either dry-heat or moist-heat stabilization methods. For this reason, it is advantageous to evaluate the two methods on the basis of the following :

1- Heat-energy consumption

2- Dehydration (one or more steps)

3- Quality of the stabilized product

If any method is adopted, the second should be its alternative. From the review of literature in our hands, the work done by Viraktamath & Desikachar (1971), may throw light on the suitability and efficiency of dry-heat stabilization in this respect. The comparison was made by using :

1- Steaming treatment of the bran in layers of 0.5 to 1 m. thickness in a steam cooker for periods ranging from 5 to 30 minutes. The bran was then dried to a moisture content below 10% in a cabinet dryer. Storage of the bran showed that the FFA content of ca. 8 % is recorded even after storage of 80 days at 37° C.

2- Dry-heat stabilization in a revolving drum provided with a tight, fitting lid, was also carried out. After charging the bran, the material was heated until steam began to emerge from a certain valve. Heating (110 - 115° C) was continued for 5 minutes after allowing the air to escape.

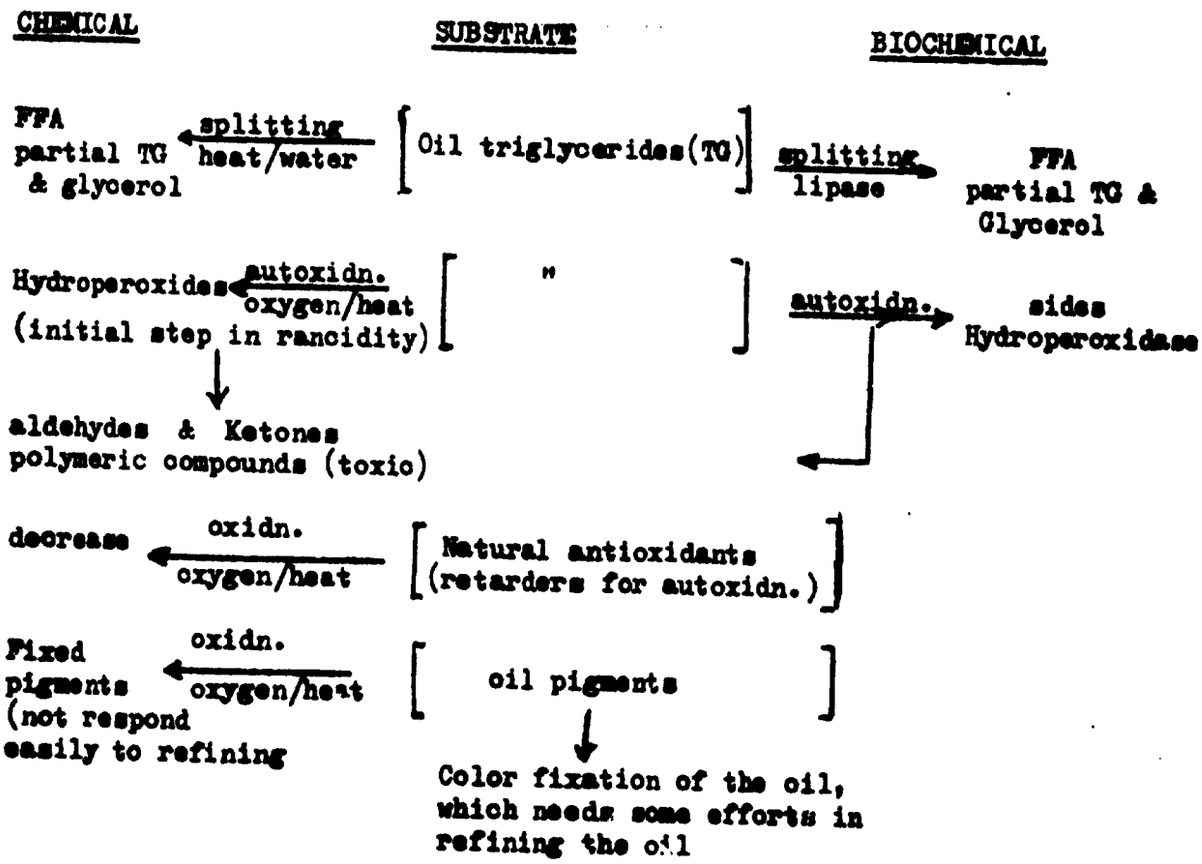
It was found that storage of the dry-heat stabilized bran had FFA content below 10 % even after more than 120 days indicating that the treatment in the roaster is effective in destroying the lipase.

The adoption of one of these two methods of stabilization should depend on the technological status of small rice mills in the rural areas in the developing countries and their available facilities.

A general outlook on the chemical and biochemical reactions during stabilisation

Whether dry - or moist - heat stabilisation is followed, chemical as well as biochemical reactions a e possibly taking place during the stabilization of the bran.

For simplicity, these can be represented as follows (depending on the degree of temperature, the length of the heating period, the moisture content, ...etc...):



Furfural compounds ← Millard reaction (heat) [sugar & amino acids]

decrease in the quality of protein ← denaturation (heat) [protein & amino acids]

non-available heat/hydroxy compounds

non-available amino acids

The net result of heating :

1- FFA 2- Partial TG
3- Fixed pigments
4- Hydroperioxides
5- non-available amino acids
6- denaturation of protein

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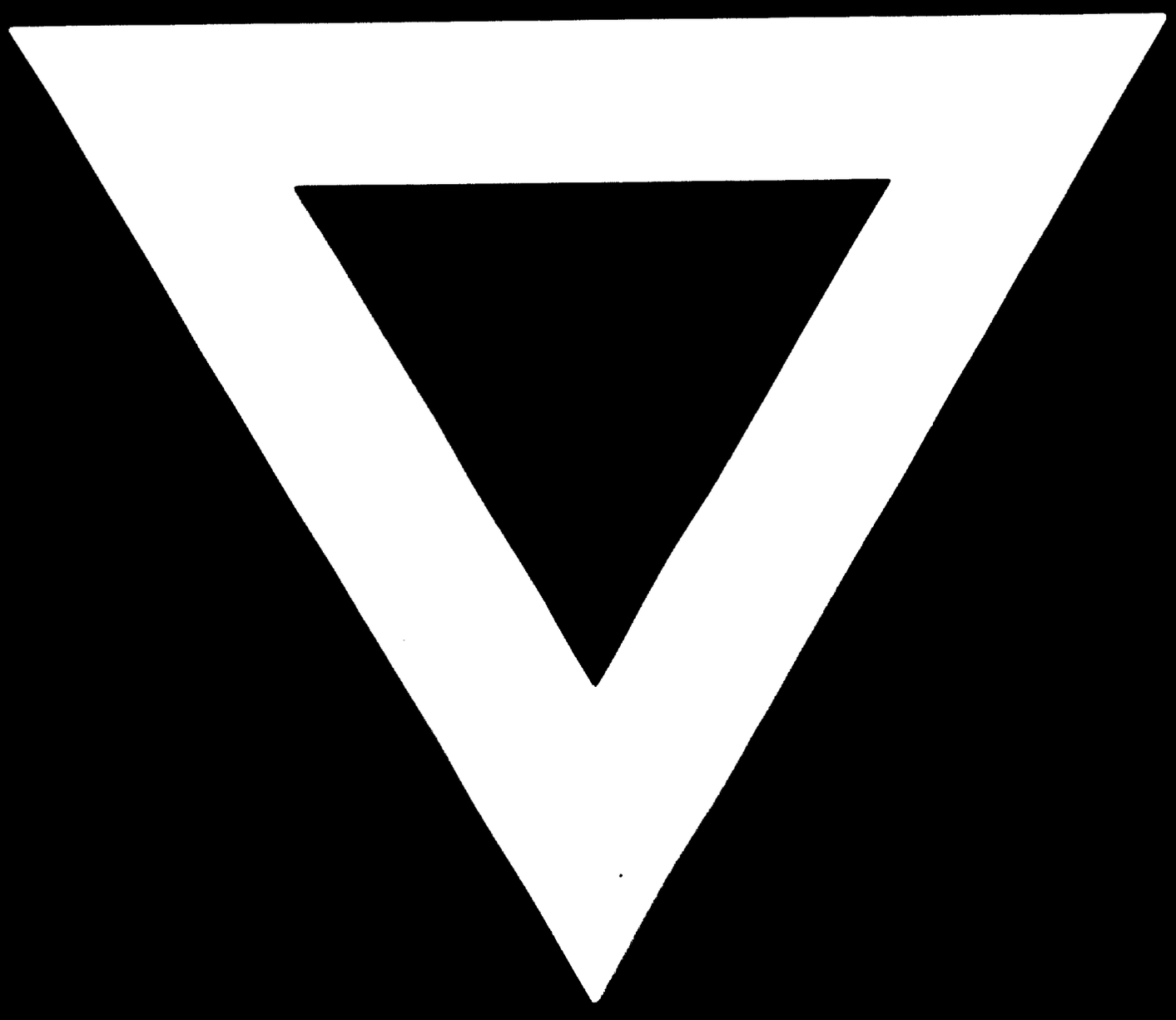

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