

C-07: The effect of aerated soaking on the quality of parboiled rice

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Parboiling is a commonly used method of precooking the paddy within the hull. There are 3 steps in parboiling:
Soaking; Steaming; Drying.

Soaking for a prolonged period under anaerobic conditions (submerged) causes off flavours, odours and darker colours. So the new method of soaking introduces aerobic conditions.

Objectives: To evaluate the following qualities of aerated, cold soaked parboiled rice:

- (1) Milling quality;
- (2) Nutritional quality;
- (3) Eating quality.

To evaluate the effect of heat treatment prior to aerated soaking.

BG 11-11 paddy variety was used for the experiment. This was checked for initial quality. Three equal samples were soaked for durations of 20, 24, 28, 32 h under 3 different conditions:

Submerged soaking by dipping the samples in a water bath; Aerated soaking by allowing water to circulate continuously and deliver on the paddy by means of small droplets; Heat treatment for 3 min at 55°C and left for 10 min before transferring to aerated soaking unit.

Each soaked paddy sample was then steamed for 15 min. Steamed samples were dried at 60 °C. Afterwards the samples were milled and polished at 3 degrees of polishing levels. Then the following quality analyses were done.

- a) Milling quality - Evaluated by percentages of head rice, brokens and degree of parboiling
- b) Nutritional quality - By determining the crude protein content.
- c) Eating quality - By sensory assessment

Analysis of variance procedure was used to determine whether statistical differences existed in the data obtained.

The paddy sample used for the experiment contained a rather high percentage of other types of varieties, impurities and pre-shelled grains (7.16 and 0.6% respectively.)

Aerated soaked parboiled rice showed lower percentage of brokens, chalkiness and higher percentage of head rice than the submerged soaked parboiled rice. At each soaking duration parboiled rice, aerated soaked with initial heat treatment resulted in lower percentage of brokens, chalkiness and higher head rice yield than the rice produced under the other 2 soaking conditions. A lower percentage of brokens, chalkiness and higher head rice were obtained with increased duration of soaking.

At all degrees of polishing levels aerated parboiled rice with initial heat treatment showed the highest crude protein content. Submerged soaked parboiled rice showed the least amount of crude protein (*Table 1*)

Except for texture, aerated cold soaked parboiled rice scored higher median values than submerged soaked parboiled rice for characters such as smell, appearance, colour, taste and general acceptability. Aerated soaked parboiled rice with heat treatment scored more or less similar values to aerated soaked parboiled rice without heat treatment except for texture and general acceptability. Submerged soaked parboiled rice compared to treated samples scored the least median values for all the characters. The comparative values for general acceptability were 3.833 for aerated soaked with pre-treatment and only 3.0 for submerged soaking.

At all degrees of polishing levels aerated cold soaked parboiled rice with initial heat treatment shows a higher crude protein content. A higher crude protein content is obtained at a lower degree of polishing level. When aerated cold soaking is applied for a duration of 32h, a less chalkiness percentage can be expected. This results in a higher head rice yield with a lesser percentage of brokens. Sensory assessment substantiated that aerated cold soaked parboiled rice as compared to the submerged soaked parboiled rice is preferred for almost all sensory characters of smell, appearance, colour, taste and general acceptability. Although the cost of pre-treatment with hot water prior to soaking is expensive, the market value may be high because of high quality.