ANALYSIS OF PADDY GRAIN AND RICE QUALITY IN MADAGASCAR
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TECHNICAL GUIDE

ANALYSIS OF PADDY GRAIN AND RICE QUALITY
IN MADAGASCAR

CENTRE DE FORMATION ET D’APPLICATION DU MACHINISME AGRICOLE
(CFAMA), ANTSIRABE 2012
ANALYSIS OF PADDY GRAIN AND RICE QUALITY
IN MADAGASCAR

EPPENDIX :

FINAL REPORT, ON PROJECT FOR PRODUCTIVITY IMPROVEMENT IN CENTRAL HIGHLAND
IN THE REPUBLIC OF MADAGASCAR
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Post-Harvest Technologies, August 2012 - February 2013)
Papriz - Japan International Cooperation Agency (JICA)
I. INTRODUCTION

Rice quality affects consumer preferences and the price of rice. Understanding the quality of rice is rice physico-chemical characteristics that affect the price of rice. Therefore, to determine the price of rice should be made Rice quality standard with the quality criteria that determine the price of rice. Characteristics of rice that determine the price of rice become rice quality criteria such as level of dryness (moisture content), clean (percentage of foreign materials), the appearance of intact rice (percentage of head rice, broken rice, minutes kernel, green and chalkyness grain), the condition is not damage rice (percentage of yellow / damage grain), the color of white rice (polished degree, the percentage of red grains) and contains no paddy grain.

Quality rice different as rice quality manipulation. Factors affecting the quality (varieties, agro-ecosystems, cultivation techniques, post-harvest handling and processing, equipment, human resources and social culture.

Madagascar does not have: (a) National Standard Madagascar (SNM) for the paddy grain and rice quality. Although the rice trade was grade of rice quality, seen from the price of rice in the market is different with different quality classes. Measurement of quality classes of rice is just the visual appearance. Therefore, it is necessary quantitatif based on the criteria: white, intact, dryness or clean, (b) laboratory testing and quality analysis method for paddy grain and rice, (c) data analysis paddy and rice grain quality in rice variety each local / introduction and (d) The government still the priority on increasing production and selfish society full of the delicious. This is evident from the high per capita consumption of rice and to choose a rice texture is hard (amylose content of more 25%) so early satiety.

To determine the quality of paddy grain and rice in Madagascar need quality analysis methods paddy grain and rice that can be used to develop laboratory paddy grain and rice quality and the design of Madagascar National Standard Format (SNM) paddy grain and rice in the future.

II. METHOD OF PADDY AND RICE QUALITY ANALYSIS

2.1 DEFINITION OF QUALITY COMPONENT

2.1.1. Paddy grain quality

- **Paddy grain quality components consist of** moisture content, empty grain, dirt, green grains, chalkyness grain, yellow grains, damaged grains, red grains, foreign matter and other varieties.
- **The moisture content is the amount of water content in the paddy grains are expressed in percent of wet weight (wet basis)**
- **Empty grain are not fully developd of paddy grain, but the two handfuls of chaff intact and does not contain a grain of rice. The components included in the empty grain is both handfuls of rice husks still intact, but no rice grains due to pests or other causes. Grains fall into the half-empty grains.**
- **Dirty are foreign maerials that are not classified as paddy grain, such as wood, scrap metal, rice stalk / crops, other grains, dead insects and other pests. The components included in the feces are paddy grains that have been pared (brown rice) and paddy grain broken.**
- **Chalkyness grain is brown rice as chalk (Chalky) color and soft textued caused by physiological factors. Grains, chalky color and hard texture categorized as healthy (not a chalky grain).**
- **Green grain is brown rice greenish colored and textured soft due to harvest too young (before the perfect fruit ripening process.) This is characterized by bouts of easily broken green grain. Green grains hard and intact categorized as wholesome grains (no green grain).**
2. Measurement of grain hollow / dirt with a sieve slot width of 1.7 mm (for grain type of fat, such as Cisadane) or sieve slot width of 1.6 mm (for grain slim type, such as IR64). Or by the method of 95% alcohol. A total of 100 grams of material was soaked in 400 ml of 95% alcohol in 400 ml of 95% alcohol.

2.1.2. Rice quality

- Moisture content of rice which is the amount of water content in the grains are expressed in per cent of wet weight (wet basis).
- Milling Degree (MD) is the release rate of a layer of bran (aleurone) and agencies of grains of rice on polished.
- MD 100 is the results of the milling process in which all layers rice bran (aleurone) and a few institutions endosperm has been removed from the rice grain polished.
- MD 90 is the results of the milling process in which a layer of rice bran (aleurone) and institutions have largely been separated from the grains of rice, so the rice is coated and aleurone (bran) are 10%. Opaque color or translucency of rice does not affect the value of the milling degree.
- Head rice is healthier rice grains and defects have a size of more than 6/10 part of the average length of whole rice grain.
  - Broken rice is healthier rice grains and defects have a size of less than 6/10 part, but more than 2/10 part of the average length of whole rice grain.
  - Minute kernel are broken rice, both healthy and disabled who have smaller or equal to 2/10 portions of rice intact.
  - Chalkyness grain is a grain of rice whitewash white as chalk and soft texture (marked by broken) due to physiological processes. Grains of white rice semillar chalk yet firm texture and full (not broken) not be categorized as a chalkyness grain, but healthy grains. Grains of rice Young white and soft chalk green due to be harvested before perfectly ripe grain categorized as chalkyness grain.
- Yellow grain is a yellow head rice, broken rice and minutes kernel are yellow, brownish yellow or yellowish discoloration due to processes that occur during the maintenance process.
- Damage grain are damaged head rice, broken rice and groats white / clear, white whitewash, yellow and red have more than one other color spots or freckles. Rice single small spots that are not potentially (has the possibility of becoming damage) not excluding damage garin.
- Red grain is a red head rice, broken rice and groats are red because native varieties. Glutinous rice mixed with rice grains categorized as red grain.
- Foreign materials are foreign objects that are not classified as rice, grains such as soil, sand, gravel, scrap metal, scrap wood, stalks of rice, other grains, dead insects and other pests.
- Paddy grain rice is paddy grain that has not been pared most of the rice milling process. Included in this category is broken leprosy is still husky.

2.2.1. Component of paddy grain quality

1. Moisture content measurements by means moister tester or with Oven

2. Measurement of grain hollow / dirt with a sieve slot width of 1.7 mm (for grain type of fat, such as Cisadane) or sieve slot width of 1.6 mm (for grain slim type, such as IR64). Or by the method of 95% alcohol. A total of 100 grams of material was soaked in 400 ml of 95% alcohol.
alcohol for 15 minutes, stirring until blended. Grain hollow / dirt that floats dried and weighed.

\[
\text{Weight of grain hollow / dirt} \\
\text{The level of grain hollow / dirt (%) = } \frac{\text{Weight of grain hollow / dirt}}{100} \times 100\%
\]

3. Measuring the percentage of grain green / lime, yellow grain / broken, red grains

Take 100 grams of grain moisture content was dried at 145, and then peeled the skin to brown rice (CPC) by using a mini-husker. Weigh brown rice as much as 50 grams. Perform the separation of whole grains and non-grain piece of green / lime, yellow grain / broken, and red grains by hand or tweezers. Levels of green grain or grain whitewash, grain yellow / damaged, and red grains calculated by the formula;

**Calculation:**

\[
\text{Weight of green + Chalkyness grain} \\
\text{The level of green + chalkyness grain = } \frac{\text{Weight of green + Chalkyness grain}}{\text{Weight of brown rice}} \times 100\%
\]

\[
\text{Weight of demage/ kernel yellow grain} \\
\text{Levels of demage/ kernel yellow grain=} \frac{\text{Weight of demage/ kernel yellow grain}}{\text{Weight of brown rice}} \times 100\%
\]

\[
\text{Weight of red grain} \\
\text{Levels of red grain = } \frac{\text{Weight of red grain}}{\text{Weight of brown rice}} \times 100\%
\]

**2.2.2. Component of Rice Quality**

1. Measuring the degree of polished

Weigh the rice samples to be analyzed as much as 0.8 kg. The measurements were made visually with the help of a magnifying glass and compared with the comparison sample (standard / control)


A total of 300 grams of sample clean shelled grain brown rice with a mini tool husker. A total of 100 grams of brown rice polished to a mini polisher. From the results penyosohan then weighed heavily milled rice, and then separated by means of a separate grading drum heads with rice broken rice groats +. To separate broken rice and groats used @ 2 mm sieve size.

Results penyosohan also visually separated grain green / lime, yellow grain / broken, and red grains from whole grains and not whole hand or tweezers. How to measure the components of this rice is to use the following formula:

\[
\text{Weight of head rice (grams)} \\
\text{The yield of head rice (%) = } \frac{\text{Weight of head rice (grams)}}{\text{Weight of milled rice sample (grams)}} \times 100\%
\]
Weight of broken rice (grams)
The yield of broken rice (%) = \frac{\text{Weight of broken rice (grams)}}{\text{Weight of milled rice sample (grams)}} \times 100\%

Weight of minute kernel (grams)
The yield of minute kernel (%) = \frac{\text{Weight of minute kernel (grams)}}{\text{Weight of milled rice sample (grams)}} \times 100\%

Weight of green + Chalkyness grain
The level of green + chalkyness grain = \frac{\text{Weight of green + Chalkyness grain}}{\text{Weight of milled rice}} \times 100\%

Weight of damaged + Yellow grain
The levels of damaged + yellow grain = \frac{\text{Weight of damaged + yellow grain}}{\text{Weight of milled rice}} \times 100\%

Weight of red grain
The levels of red grain = \frac{\text{Weight of red grain}}{\text{Weight of milled rice}} \times 100\%

Weight of paddy grain
The levels of paddy grain = \frac{\text{Weight of paddy grain}}{\text{Weight of milled rice}} \times 100\%

Weight of foreign material
The levels of foreign material = \frac{\text{Weight of foreign material}}{\text{Weight of milled rice}} \times 100\%

### 2.3. Standard of paddy and rice quality

#### Table 1. Indonesian National Standard for Paddy No. 01-0224-1987

<table>
<thead>
<tr>
<th>No</th>
<th>Quality Criteria</th>
<th>Unit</th>
<th>Grades</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>1</td>
<td>Moisture content</td>
<td>(% max.)</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Grain hollow / dirt</td>
<td>(% max.)</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Damaged/yellow grains</td>
<td>(% max.)</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Chalkyness grains</td>
<td>(% max.)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Red grains</td>
<td>(% max.)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Foreign material</td>
<td>(% max.)</td>
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</tr>
<tr>
<td>7</td>
<td>Paddy of other variety</td>
<td>(% max.)</td>
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#### Table 2. Indonesian National Standard for Rice No. 6128-2008

<table>
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<th>No</th>
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<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>1</td>
<td>Milling degree</td>
<td>(% min.)</td>
<td>100</td>
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<tr>
<td>2</td>
<td>Moisture content</td>
<td>(% max.)</td>
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<td>3</td>
<td>Head rice</td>
<td>(% min.)</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>Broken rice</td>
<td>(% max.)</td>
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<tr>
<td>5</td>
<td>Minute kernel</td>
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</tr>
<tr>
<td>6</td>
<td>Red grains</td>
<td>(% max.)</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Damaged/yellow grains</td>
<td>(% max.)</td>
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</tr>
<tr>
<td>8</td>
<td>Chalkyness grains</td>
<td>(% max.)</td>
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</tr>
<tr>
<td>9</td>
<td>Paddy grain</td>
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</tr>
<tr>
<td>10</td>
<td>Foreign material</td>
<td>(% max.)</td>
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</tr>
</tbody>
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Figure 1. Structure of paddy grain

Figure 2. Shape and size for rice

Green grains
Red grains
Chalkiness grains
Damage/ yellow grains
Brown rice
2.4. Peralatan Analisis Mutu Beras