



Preventing Rice Grain Discoloration

In field:

- ◆ Sowing date should allow for harvesting in the dry season.
- ◆ Harvest crop at maturity, at the correct time and correct moisture content.
- ◆ Employ measures to reduce damage caused by pest in the fields.

After Harvesting

- ◆ Avoid delays in drying grains after harvesting.
- ◆ Paddy should be dried to appropriate moisture content based on duration of storage.

Purpose	MC %
Storage for more than a year	<9
8-12 months storage	9-13
To attain optimum milling	14

- ◆ Storage facility must be kept clean and dry.
- ◆ Ensure protection from insects and other pests during storage.
- ◆ Avoid storing grains for long periods; first-in first-out
- ◆ Old paddy stocks and recently harvested grains should be stored separately.
- ◆ Aerate grains to safe and equalized temperatures throughout the grain mass. For grains stored in silos, the variation of the air distribution must be dimensioned according to the height and diameter of the silo.
- ◆ Monitor stored grains on a regular basis and aerate as needed to maintain low moisture and proper temperature.



GUYANA RICE DEVELOPMENT BOARD

POSTHARVEST DEPARTMENT



GRAIN

DISCOLORATION



GRAIN DISCOLORATION

Grain quality is usually determined by a combination of related factors which include: moisture content of paddy, purity degree, varietal purity, cracked grains, immature grains, and discolored/fermented grains and damaged grains. These factors are influenced by the varietal properties and environmental conditions which occur during crop production, harvesting, and postharvest practices.

Grain discoloration reduces consumption appeal and thus the market value of the rice. Discoloration may occur externally on the glumes or internally on the kernels, or on both. On milled rice, discolored grains may appear as brownish-black, light yellow to orange-red, irregular lesions, chalkiness and shriveling.

Factors Contributing to Grain Discoloration

- ◆ Pathogenic microorganisms
- ◆ Insect damage in the field
- ◆ Overexposure of paddy to wet environmental conditions before it is dried.
- ◆ Improper and delayed drying.
- ◆ High humidity during storage
- ◆ Improper storage of grains.

Microbial Discoloration

Rice kernels discoloration may be due to bacterial or viral infection but is most often associated with fungal infection. Fungi responsible for grain discoloration in the field include: *Pyricularia oryzae*, *Fusarium spp*, and *Sarocladium oryzae*. Fungi commonly associated with discoloration during storage are *Aspergillus* and *Penicillium*. The development of fungi in stored grains is influenced by:

- ◆ Moisture content of the stored grains
- ◆ Temperature
- ◆ Length of time the grain is stored
- ◆ Amount of insect activity in the grain
- ◆ Condition of the grain going into storage.



High Moisture Content and Temperatures

Postharvest yellowing (PHY) or stack-burn causes deterioration of milled rice quality and functionality. PHY appears as light-yellow to orange-red on milled rice and is often associated with high kernel moisture contents and temperatures during storage. Yellowing is theorized to be caused by both enzymatic and non-enzymatic reactions.

The high temperatures are produced due to embryo and microbial respiration.



Delayed & Improper Drying

Improper handling of the grains before and during drying also causes yellowing. Delayed drying of rice after harvesting causes heat burns or heat discoloration, producing yellow kernels. Delays in drying also leads to excess fungal growth which also yields discolored kernels.

Insect Damage

Paddy bug/stink bug (*Oebalus spp.*) infestations may enhance the occurrence of grain discoloration. The paddy bug is not directly responsible for discolored grains but favor the spread of pathogens. Paddy bugs feed by inserting their stylets into the grain which causes injury and creates an entry site for the introduction of fungi and other microbes into the rice kernels.

