IMPACT OF LONG-GRAIN ROUGH RICE STORAGE CONDITIONS ON COOKED RICE SENSORY PROFILE

Mariana Rodríguez-Arzuaga, **Blanca Gómez-Guerrero,** Natalia Ponce de León and María Alejandra Billiris Julien

Latitud - LATU Foundation, Montevideo, Uruguay

Introduction

Rice undergoes different biochemical and physiological scenarios when stored inside a bin. Operating conditions during storage, such as location in the bin, aeration regime and ambient conditions define grain temperature (T) and moisture content (MC). Grain conditions as well as storage period (t), impact rice quality. The objective of this investigation was to study the effect of different storage conditions (MC, T and t) on the sensory attributes of cooked rice.

Methodology

Rice (cv El Paso 144) was harvested in Rocha (Uruguay) at an average MC of 21.4%, cleaned and mixed before random division in two lots.

The two lots were gently dried (in a lab chamber at 25°C and 65% relative humidity) until 15 and 13% MC, respectively.

After drying, samples were packed in sealed multilayer bags and stored at 5, 10, 20 or 30°C (Fig.1).

Sensory descriptive analyses were performed after 0, 3, 7 and 10 months of storage.

Sixteen panelists selected and trained to evaluate cooked rice, developed 39-attributes related to aroma, flavor, appearance and texture. Samples were cooked in an electronic rice cooker with a 1:2 rice-to-water mass ratio. Immediately after cooking, subsamples were placed in soufflé cups, covered with plastic lids and let stand for 10 min before evaluation. Each panelist evaluated every sample in duplicates using 15-point numerical scales (Figure 2).

Figure 2. Sensory descriptive analyses. a) Training session b) Rice cooker c) sample preparation d) Sample evaluation.
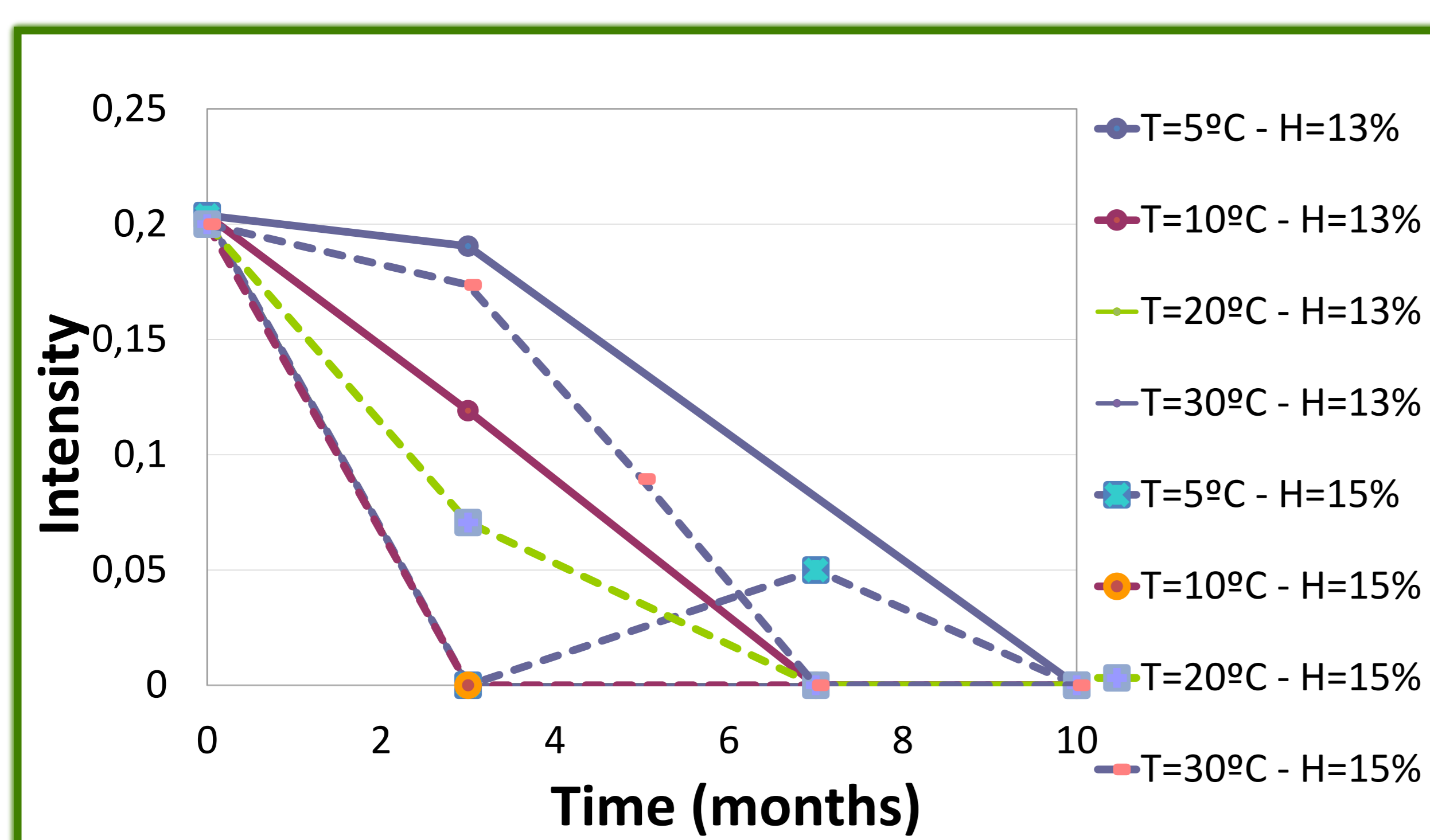

Rough Rice El Paso 144 (MC: 21.4%)

Cleaning

Mixing

Drying conditions: 65% RH, 25°C

MC 12.9%   MC 14.9%

Packaging in sealed multilayer bags

14.9% 12.9% **5°C**   14.9% 12.9% **10°C**

14.9% 12.9% **20°C**   14.9% 12.9% **30°C**

Stored for 10 months under four T conditions

Figure 1. Sample treatment and experimental design diagram.

Results

Starchy, sulfur and sweet aroma and flavor attributes were only significantly affected ($p<0.05$) by t. The highest sulfur and sweet notes were obtained at the beginning of storage (t=0) and a decline was observed over time (Fig. 3).

On the other hand, for toasted aroma, MC, t and the interactions between the three factors were significant, obtaining the highest toasted notes for samples with 15% MC stored for 10 months at the higher studied T (20 and 30ºC) (Fig. 4).

Glossiness decreased significantly with increasing T, t and MC. In the samples stored at 15% MC, the glossiness decreased from 10.5 at t=0 to 7.0 after 10 months at 30ºC (Fig. 5).

Hardness and springiness were only affected by t (data not shown).

Figure 3. Sulfur flavor of rice samples stored at different moisture contents (13, 15%) and temperatures (5, 10, 20, 30ºC).

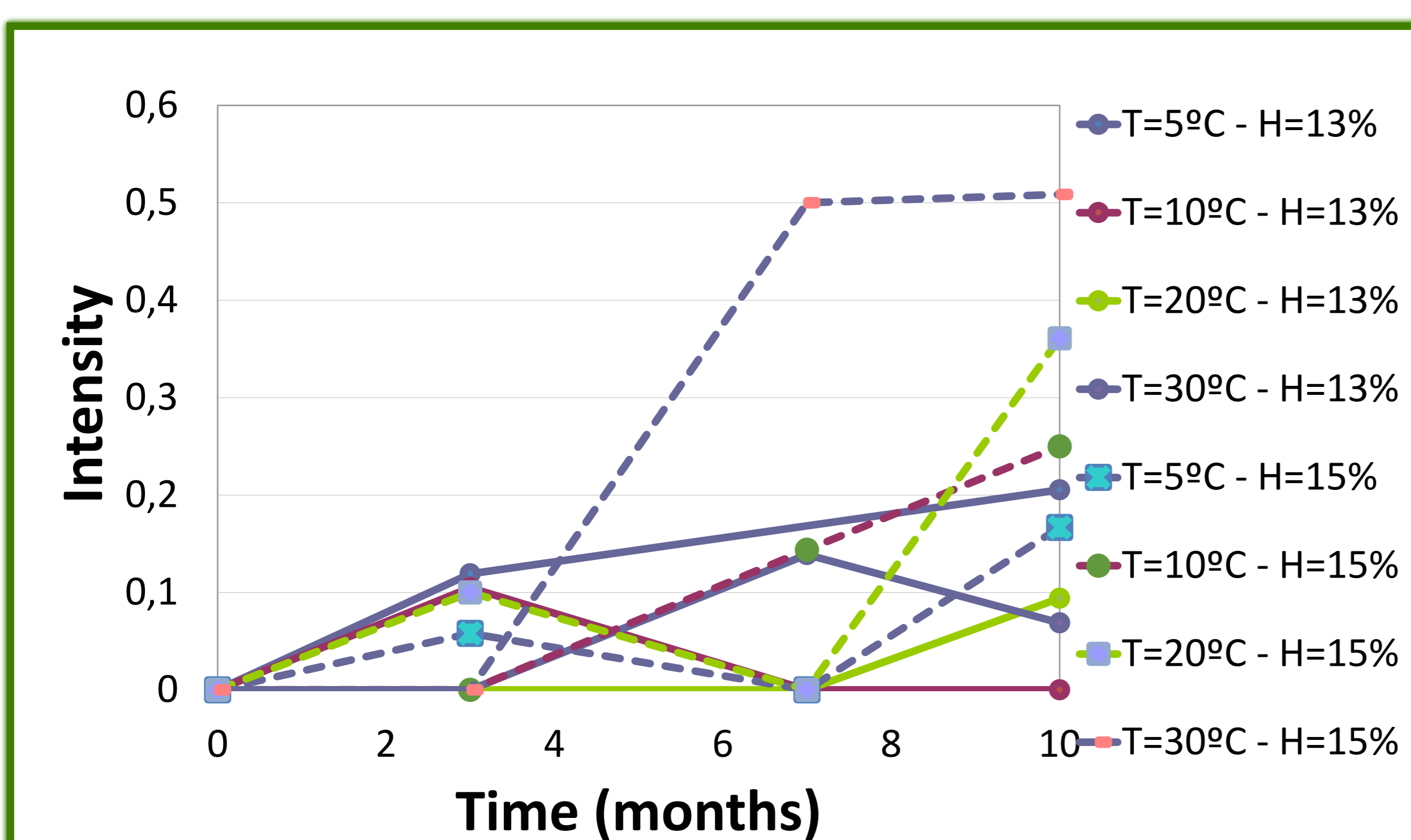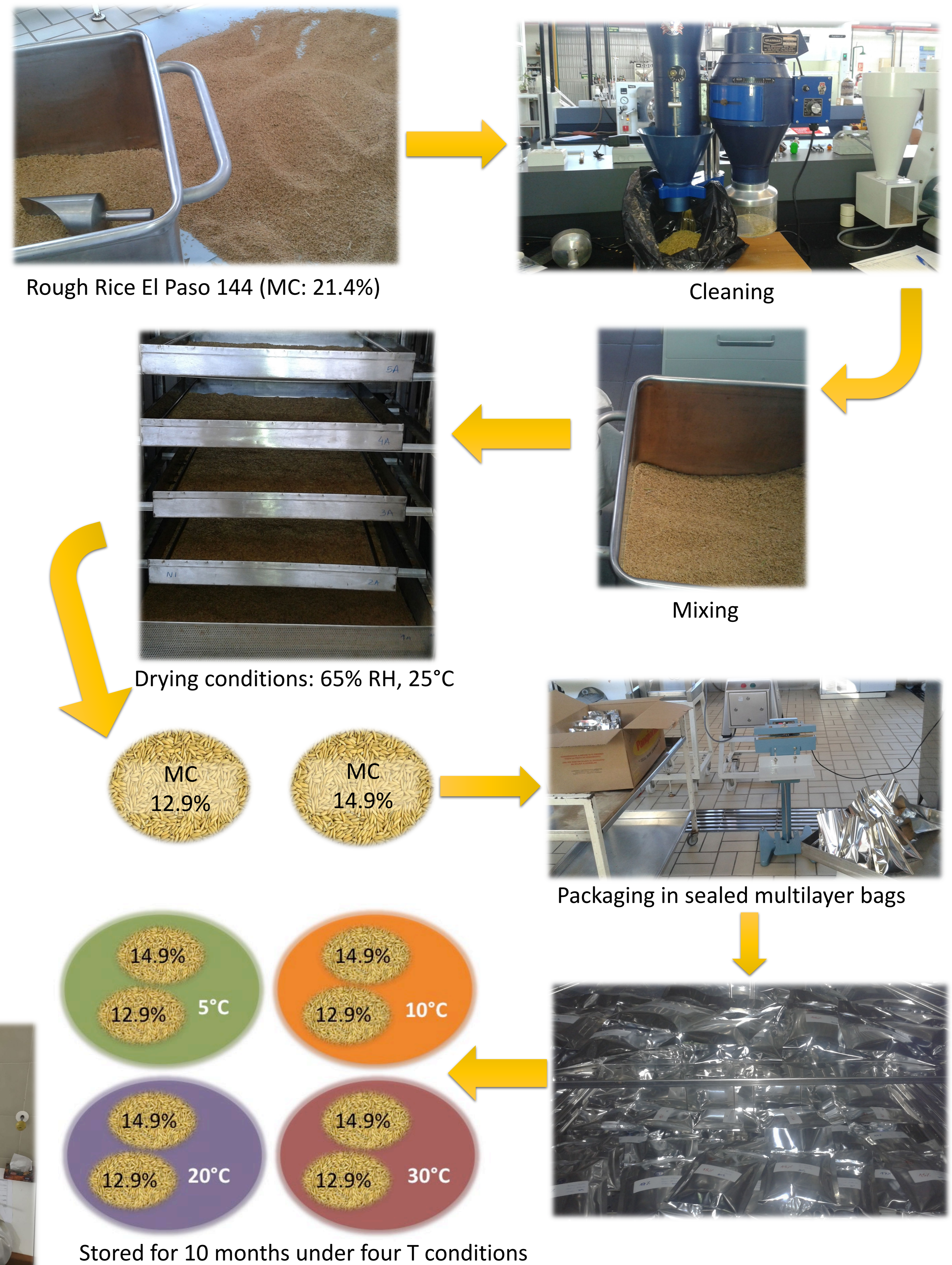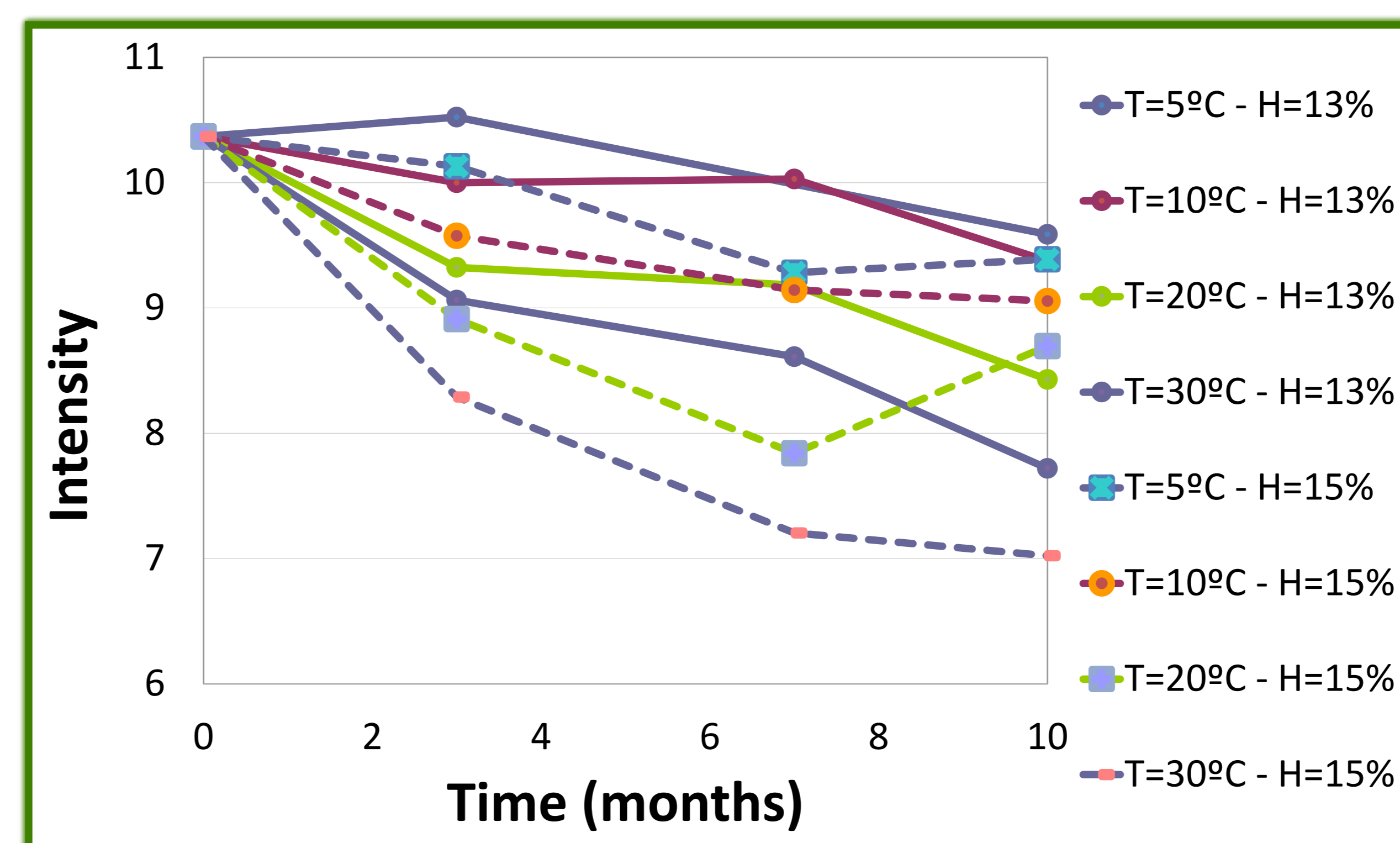**Figure 4**. Toasted aroma of rice samples stored at different moisture contents (13, 15%) and temperatures (5, 10, 20, 30ºC).

Figure 5. Toasted aroma of rice samples stored at different moisture contents (13, 15%) and temperatures (5, 10, 20, 30ºC).

Conclusions

- Storage conditions affected the sensory aroma, flavor, appearance and texture of cooked rice.
- Controlling temperature during storage is important - lower temperatures helped maintaining the initial sensory profile for longer times.
- Samples dried until 13% MC showed less sensory changes during the studied storage period.