

SHORT COMMUNICATION

QUALITY CHARACTERISTICS OF THE *BASMATI* RICE IMPORTED TO SRI LANKA THROUGH PAKISTAN-SRI LANKA FREE TRADE AGREEMENT

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INTRODUCTION

Sri Lanka has continued to import premium-quality aromatic rice (*Oryza sativa* L.), especially '*Basmati*', from Pakistan and India to fulfill the demand in the hotel industry and among the affluent. A large proportion of this requirement is met through imports from Pakistan under Pakistan-Sri Lanka Free Trade Agreement (PSFTA). These imported consignments of '*Basmati*', sold under different price tags, found to possess varying levels of quality characteristics both as raw-rice and cooked-rice. This prompted the government to launch a scientific inquiry to determine the level of standardized '*Basmati*' qualities found in the imported consignments from Pakistan and to provide regulatory directives to minimize disparities.

There are several varieties of rice possessing appealing fragrance, collectively known as aromatic rice (Husaini *et al.*, 2009). The leading aromatic rice types are *Jasmine*, *Basmati*, *Wehani* and *Taxmati* rice. The *Basmati* (known as Queen of fragrance, fragrant one, perfumed one, or the soft rice) is a variety of long grain rice originated and grown in the foot hills of the Himalayan over thousands of years, and now extensively cultivated in India, Bangladesh and Pakistan for local consumption and for export. *Basmati* rice has a notable fragrance and a delicate flavor. The grains of *Basmati* rice are long and slender than most other types of rice, which elongates more than twice of its original size upon cooking. Cooked grains of *Basmati* rice are characteristically free-flowing rather than sticky, unlike most other kinds of long-grain rice. It can be uniquely identified by its fragrance caused by the aroma compound, 2-acetyl-1-pyrroline (Nadaf *et al.*, 2006). In addition to normal white *Basmati* rice, a brown *Basmati* is also available. The area cultivated, method of harvesting, processing and ageing also contribute to enhance these characteristics features to *Basmati* rice (Dela Cruz and Khush, 2000)

There are several varieties of *Basmati* rice. The traditional types include *basmati 370*, *basmati 385*, and *basmati Ranbirsinghpura* (Bansal *et al.*, 2006) In addition, *Pusa Basmati-1* is a hybrid semi-dwarf plant, which has most of the good

features of traditional basmati such as grain elongation, fragrance and alkali content (Bansal *et al.*, 2006). There are non-traditional aromatic rice varieties derived from crosses with *Basmati* marketed under a Sugandh designation (Bansal *et al.*, 2006). According to the Canadian Diabetes Association (Mahesh, 2007), *Basmati* rice has a "medium" glycemic index (between 56 and 69) thus, making it more suitable for diabetics as compared to certain other grains and products made from wheat flour. *Basmati* rice is also gluten-free, which makes it an ideal stable food product for those who cannot to tolerate gluten.

Difficulty in differentiating genuine *Basmati* from other types of rice and the significant price differences between them has led fraudulent traders to adulterate *Basmati* rice with crossbred *Basmati* varieties and long-grain non-*Basmati* varieties in the worldwide markets. In Britain, the Food Standards Agency (2005) reported that about half of all *Basmati* rice sold was adulterated with other strains of long-grain rice, prompting rice importers to sign up to a code of practice. A study carried out in UK on rice supplied by wholesalers reported that four out of 15 samples had cheaper rice mixed with *Basmati*, and one had no *Basmati* at all (Juliano and Villareal, 1993).

The main objective of this study was to test the '*Basmati*' rice samples collected from the Sri Lanka Customs for their purity, uniformity and deviations from the characteristic *Basmati* qualities to enable developing guidelines for importers of this premium quality rice.

MATERIALS AND METHODS

A total of 140 sealed-samples of '*Basmati*' rice imported from Pakistan during 1st to 25th March 2011 under the PSFTA were examined at the Rice Research and Development Institute (RRDI) at Batalagoda, Sri Lanka for purity and grain characteristics before and after cooking, according to prescribed procedures by the International Rice Research Institute (IRRI; Dela Cruz and Khush, 2000). The samples were provided by the Sri Lanka Customs (Ref: Sri Lanka Customs D/ MISC/ 2011/ 6-49). For comparison, the standard *Basmati*, the traditional *Basmati* 370 and the improved *Basmati* "*Pusa Basmati-1*" (Anonymous, 2004) were used. The data collected included length of uncooked rice (mm), length of cooked kernels (mm), elongation ratio, shape of the cooked rice (banana shape) and softness of the cooked rice (Dela Cruz and Khush, 2000)

RESULTS AND DISCUSSION

Out of the 65 samples (from a total of 140 samples) that were evaluated for their grain characteristics (Table 1), none of the samples had *Basmati* features except for the grain length that ranged from 6.2 – 6.9 mm, and six samples with banana-shape cooked rice as in the standard *Basmati*. However, the length of the cooked rice kernels of the test samples ranged from 8.2 – 10.5 mm compared to the standard kernel length (10.5 - 12.8 mm). The elongation ratio of the samples were below the value obtained for the standard *Basmati* (1.7 – 1.8). None of the samples had specific aroma of *Basmati*. Hence, '*Basmati*' imported to Sri Lanka from Pakistan under PSFTA are not genuine *Basmati*.

Table 1. Quality characteristics of the test rice samples and the standard *Basmati* varieties

| Container Number | Length of | | Elongation ratio | Aromatic property | Banana | |
|------------------|-----------------|--------------------|------------------|-------------------|-----------------------------|-------------------------|
| | Raw kernel (mm) | cooked kernel (mm) | | | shape of cooked rice kernel | Softness of cooked rice |
| EISU 3675116 | 6.83 | 9.70 | 1.4 | None | No | No |
| EISU 3799950 | 6.50 | 9.20 | 1.4 | None | Yes | No |
| LTIU 3010887 | 6.60 | 9.00 | 1.4 | None | No | No |
| IMTU 3026725 | 6.61 | 9.30 | 1.4 | None | No | No |
| EMCU 3869309 | 6.40 | 9.61 | 1.5 | None | No | No |
| CLHU 2963167 | 6.78 | 8.85 | 1.3 | None | No | No |
| TTNU 2627528 | 6.41 | 9.45 | 1.5 | None | No | No |
| PRSU 2213529 | 6.60 | 9.20 | 1.4 | None | No | No |
| CLHU 3275359 | 6.66 | 10.2 | 1.5 | None | No | No |
| TEXU 2560488 | 6.49 | 9.20 | 1.4 | None | No | No |
| INNU 2973956 | 6.48 | 8.95 | 1.4 | None | No | No |
| DRYU 2040704 | 6.69 | 9.65 | 1.4 | None | No | No |
| APZU 3432394 | 6.61 | 9.40 | 1.4 | None | No | No |
| GLDU 3517322 | 6.69 | 9.65 | 1.4 | None | No | No |
| TCLU 2180717 | 6.64 | 10.1 | 1.5 | None | Yes | No |
| TGHU 2165558 | 6.86 | 9.25 | 1.3 | None | No | No |
| TRLU 3904539 | 6.68 | 9.65 | 1.4 | None | No | No |
| APZU 3796647 | 6.5 | 9.2 | 1.4 | None | No | No |
| GLDU 3647959 | 6.64 | 9.2 | 1.4 | None | No | No |
| ATZU 3906770 | 6.61 | 9.3 | 1.4 | None | No | No |
| TGHU 0614388 | 6.50 | 9.2 | 1.4 | None | No | No |
| GESU 3300264 | 6.4 | 9.5 | 1.5 | None | No | No |
| TCKU 2621918 | 6.7 | 9.3 | 1.4 | None | Yes | No |
| TTNU 3640972 | 6.5 | 9.6 | 1.5 | None | Yes | No |
| FUIU 2670423 | 6.5 | 9.8 | 1.5 | None | No | No |
| FCIU 2166496 | 6.7 | 9.8 | 1.4 | None | No | No |
| FCIU 3458830 | 6.48 | 9.25 | 1.4 | None | No | No |
| PANA 4232274 | 6.39 | 9.20 | 1.4 | None | No | No |
| STXU 2068711 | 6.46 | 8.70 | 1.3 | None | No | No |

| | | | | | | |
|--------------------------|------|-------|------|----------|-----|-----|
| TCKU 3429788 | 6.48 | 8.95 | 1.4 | None | No | No |
| RLSU 350496-6 | 6.60 | 9.75 | 1.5 | None | No | No |
| OOLU 1355147 | 6.48 | 9.60 | 1.5 | None | No | No |
| OOLU 1753114 | 6.62 | 9.25 | 1.4 | None | No | No |
| TRLU 2135234 | 6.22 | 8.70 | 1.3 | None | No | No |
| PRSU 2265327 | 6.55 | 8.15 | 1.2 | None | No | No |
| TTNU 3467656 | 6.47 | 8.70 | 1.3 | None | No | No |
| TEXU 2207085 | 6.56 | 8.70 | 1.3 | None | No | No |
| FCIU 3274710 | 6.52 | 8.85 | 1.4 | None | No | No |
| EGHU 3028874 | 6.42 | 9.20 | 1.4 | None | No | No |
| EISU 3819928 | 6.31 | 9.55 | 1.5 | None | No | No |
| EMCU 3473848 | 6.51 | 8.75 | 1.3 | None | No | No |
| GLDU 3838317 | 6.56 | 8.00 | 1.2 | None | No | No |
| TGHU 1205363 | 6.48 | 8.65 | 1.3 | None | No | No |
| BMOU 2023671 | 6.57 | 10.3 | 1.6 | None | No | No |
| EGHU 3037367 | 6.54 | 9.35 | 1.4 | None | No | No |
| EMCU 3525962 | 6.60 | 9.25 | 1.4 | None | Yes | No |
| FSCU 7487800 | 6.60 | 9.10 | 1.4 | None | No | No |
| XINU 1051908 | 6.77 | 9.50 | 1.4 | None | No | No |
| GLDU 5392440 | 6.47 | 9.10 | 1.4 | None | No | No |
| PLMU 2003723 | 6.81 | 8.8 | 1.3 | None | No | No |
| TTNU 1368551 | 6.6 | 9.3 | 1.4 | None | No | No |
| PMLU 2040054 | 6.71 | 9.9 | 1.5 | None | No | No |
| TCKU 3259830 | 6.7 | 9.6 | 1.4 | None | No | No |
| PMLU 2016058 | 6.7 | 9.2 | 1.4 | None | No | No |
| PMLU 2042592 | 6.4 | 9.9 | 1.5 | None | No | No |
| CRXU 1524253 | 6.38 | 9.55 | 1.5 | None | No | No |
| CAXU 6685657 | 6.48 | 9.15 | 1.4 | None | No | No |
| TTNU 3341333 | 6.4 | 9.4 | 1.5 | None | No | No |
| PMLU 2018908 | 6.3 | 9.3 | 1.5 | None | No | No |
| PMLU 2028207 | 6.5 | 9.4 | 1.4 | None | No | No |
| INBU 3131744 | 6.5 | 9.5 | 1.5 | None | Yes | No |
| EMCU 3722410 | 6.5 | 9.4 | 1.5 | None | No | No |
| FSCU 7453327 | 6.6 | 9.4 | 1.4 | None | No | No |
| TCLU 2643410 | 6.6 | 9.4 | 1.4 | None | No | No |
| TGHU 0708281 | 6.5 | 9.1 | 1.4 | None | No | No |
| Reference samples | | | | | | |
| <i>Basmati</i> -370 | 6.24 | 10.5 | 1.7 | Aromatic | Yes | Yes |
| <i>Pusa Basmati</i> | 7.21 | 12.88 | 1.88 | Aromatic | Yes | Yes |

Though the tested samples were long-grain type, none belonged to genuine *Basmati* types. Hence, it is clear that '*Basmati*' importers have been importing long-grain rice and sell as *Basmati* in the local market at a high price. A metric ton of *Basmati* (genuine/traditional) in the international market is around US\$ 1,000 - 1,250, where this would work out as Rs 500-600 per kg in the local market. Therefore, traders have been either mixing small quantities of true *Basmati* with

non-*Basmati* long-grain rice, or import pure long grain rice to be sold as '*Basmati*' with a higher profit (Chakravarty, 2007).

On the recommendation of Director General of the Department of Commerce Trade, Tariff and Investment Policy of Sri Lanka, approval has been granted to public and private importers (item No: 25 of list of exemptions of RPO No: 01/2010) to exempt them from making payment of customs duty on imports of large quantities of long grain *Basmati* rice from Pakistan under the Pakistan Sri Lanka Free Trade Agreement (PSFTA). It is evident from the present study that importers are bringing-in adulterated or inferior quality '*Basmati*' rice from Pakistan (and from India, too) and to sell as genuine *Basmati* rice in the Sri Lanka market (Abeysekera, 2011).

A survey conducted has revealed that 68 % of the *Basmati* rice is sold in the US and Canada is unadulterated, but more than 30 % of '*Basmati*' rice sold in the retail market of these countries are adulterated with inferior quality grains (Mahesh, 2007). Similarly, the UK government has made it mandatory, since 2004, that only certain qualities of rice can be called *Basmati* and imported to the country (Chakravarty, 2007) resulting in regulation being imposed to ensure that only the traditional and patented varieties enter the market. Mahesh (2007) suggested the development of import guidelines and introduction of PCR-based assay techniques for the detection of adulterated and '*non-Basmati*' strains as remedial measures to overcome importation of inferior quality '*Basmati*' rice to a country.

CONCLUSIONS

The '*Basmati*' rice imported to Sri Lanka under the PSFTA agreement found to be cheap '*non-Basmati*' type. Importers of this type of rice earn large profits at the expense of the lack of awareness of the consumer on the quality characteristics of genuine *Basmati* rice. Development of guidelines for the importers and introduction of PCR-based assay for detection of adulterated and non-*Basmati* strains are thus recommended to ensure genuine *Basmati* rice is imported and marketed in Sri Lanka.

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