

Paper presented at the International Rice Congress 2023 from October 16-19 in Manila, Philippines.

Quest for 2-acetyl-1-pyrroline, the molecule for aroma in Rice.

Mousumi Poddar Sarkar¹, Debal Deb²

1 Presidency University, Kolkata, India. 2 Centre for Interdisciplinary Studies, Kolkata, India

This article is based on relevant queries raised by scientists who are working for 30 years with molecule 2-acetyl-1-pyrroline (2AP), the compound for “basmati aroma” in “RICE” and in organism of evolutionarily placed far distance “Tiger”. Although we devoted quite a couple of years for unraveling different aspects about 2AP, we venture to treat this molecule once again adding many other relevant facts, we learnt since, part of it may also appeal as a case history to new researchers. 2AP has now been found in many organisms, [*Oryza sativa*; *Bassia latifolia*; *Pandanus amaryllifolius*; *Vallaris solanacea*; *Vigna radiata* and *Leptospermum scoparium*] and four mammals, Tiger, leopard, Mouse and Binturong. Thermal and Physiological Maillard reaction is a time and temperature dependent reaction between an amino acid and sugar with Strecker degradation and Amadori rearrangement. Although threshold value of 2AP is extremely low (limit of detection and limit of quantification are 0.1 and 0.4 ng per g), surprisingly small quantity is sensitive enough for our nose; but very difficult to detect even with Head Space Solid Phase Micro Extraction-Gas Chromatography-Tandem Mass spectrometry. In addition, absence of high abundance of selective ions in mass spectra of 2AP (Base peak 43, Characteristic peak at 111) in Selective Ionization Mode (SIM) create confusion for full proof. The conceptualization of the fact that disappearance of aroma of rice on acidification, reappearance on alkalization and permanent disappearance by potassium periodate revolutionize our experimental protocol. An allele *badh2* forms truncated BADH2 protein that accumulates delta 1-pyrroline, precursor of 2AP. However, among 414 rice land races, collected from all over India and cultivated by ‘Basudha trust’, many have strong aroma but lack *badh2* allele, now raise another sticky question; while some believe that *badh2* gene might have been introgressed from japonica to indica. It may be relevant in this context that all our aromatic rice samples were nonbasmati and short grain local races, locally known as ‘Gobindobhog’. Short grain aromatic land races may develop an unexplored additional aroma locus. The biochemical distinctiveness of these varieties makes it meaningful for conservation. However, the biosynthesis of 2AP in mammals yet remain unfold.