

Standardization of Digestion Procedure in Amylose Estimation of Rice

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Abstract- Amylose content of rice is considered to be the most important characteristic for predicting its cooking and processing properties. It is commonly used as an objective for cooked rice texture. Low amylose levels are associated with cohesiveness, tenderness, and glossiness of cooked rice. Conversely, high levels of amylose cause rice to absorb more water and consequently expand more during cooking, and the grains tend to cook dry, fluffy, and separate. Rice breeders invariably are concerned with the level of amylose content in their rice breeding programmes. The traditional method for estimating amylose in rice is based on the starch-iodine-blue value protocol of Sowbhagya and Bhattacharya (1979). The major drawback in this method is the strong interference of lipids in the iodine-amylose color. Therefore, defatted milled-rice flour with refluxing petroleum ether and carbon tetra chloride is recommended. In this study, an attempt was made to assess the total amylose content giving overnight digestion, using different glass containers.

Keywords- Amylose, Digestion, Jaya, Drum Phou

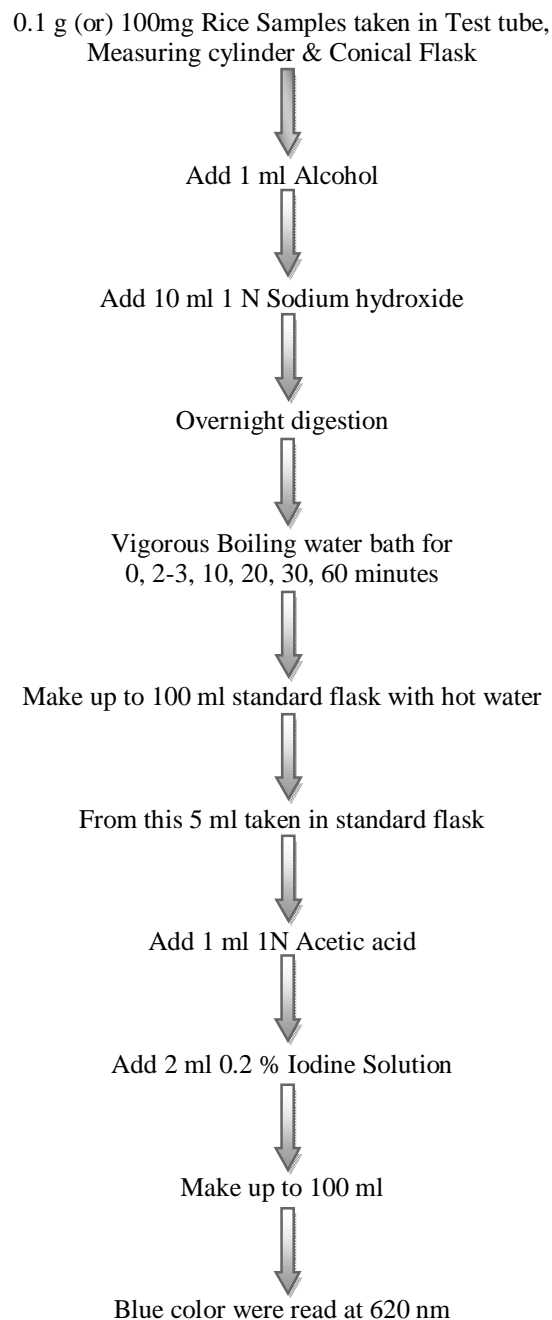
I. INTRODUCTION

Amylose content of rice is considered, the most important characteristic for predicting its cooking and processing properties. It is commonly used as an objective for cooked rice texture. Low amylose levels are associated with cohesiveness, tenderness, and glossiness of cooked rice. Conversely, high levels of amylose cause rice to absorb more water and consequently expand more during cooking, and the grains tend to cook dry, fluffy, and separate.

II. MATERIALS AND METHODS

In this study, an attempt was made to assess the total amylose content (Sowbhagya and Bhattacharya 1979; Juliano, B.O. 1971; Perez, C.M. and Juliano, B.O. 1978; Sowbhagya, C.M. and Bhaattacharya, K.R. 1979) giving overnight digestion, using different glass containers. The most widely used method for amylose estimation has been a colorimetric assay in which iodine binds with amylose to produce a blue color that is measured spectrophotometrically at one wavelength.

Flow Chart for Amylose Estimation



III. RESULT AND DISCUSSION

Normally, usage of conical flask of 100 ml size is recommended for digestion of samples. In order to expedient handling of glasswares, the usage of test tubes of following sizes was tried, (18.5 x 3 cm and 19 x 2.5 cm). Different digestion timings viz. 0, 2-3, 10, 20,30 and 60 minutes were followed. For estimation of amylose the standard procedure was adopted. Two rice varieties, one of high amylose (Jaya from Karnataka) and one of low amylose (Drum phou from Manipur) were tested both by defatting and undefatting methods. The experiments were done in triplicate. It was found that the overnight extraction of alkali soluble amylose, estimated using conical flask, accompanied by boiling for 2-3 min. resulted in the maximum extraction of amylose and surprisingly a decreasing trend of amylose was observed in further extending of the heating times viz.10,20,30 and 60 minutes (Fig 1,2,3). For the high amylose variety Jaya when it was boiled for 2-3 min. of the amylose content was 29.4% compared to 0 min.28.9, 10min.28.3, 20min.27.9, 30min. 28.0 and 60min.27.5%. For the low amylose variety Drum phou, when it was boiled for 2-3min. the amylose content was 17.9% compared to 0min.17.8, 10min17.6, 20min16.7, 30min16.5, and 60min15.94% (Table 1,1a, 1b). Both defatted and undefatted methods gave the same trend of the results. In addition, the comparison of results shows that, using of conical flask give better performance than test tubes. Hence, the overnight digestion using conical flask accompanied with 2-3min. boiling can be followed for better results compared to using of other glasswares like test tubes.

Table: 1. The defatted undefatted Amylose content (%) of Jaya and Drum Phou rice varieties by using test tube.

TEST TUBE							
Digestion duration (min)							
S. No	Rice Samples	0	2-3	10	20	30	60
Defatted Amylose (%)							
1	Jaya	24.08	27.82	23.09	25.93	21.40	27.18
2	Drum phou	17.82	17.89	16.34	16.41	15.35	16.20
Undefatted Amylose (%)							
1	Jaya	27.04	24.44	25.70	23.73	23.52	20.00
2	Drum phou	14.86	14.79	14.51	14.79	11.20	12.61

Table: 1a. The defatted undefatted Amylose content (%) of Jaya and Drum Phou rice varieties by using measuring cylinder.

MEASURING CYLINDER							
Digestion duration (min)							
S. No	Rice Samples	0	2-3	10	20	30	60
Defatted Amylose (%)							
1	Jaya	27.39	29.01	23.31	26.83	23.17	26.83
2	Drum phou	18.03	17.96	14.23	16.55	16.48	15.28
Undefatted Amylose (%)							
1	Jaya	24.44	24.65	21.76	23.80	23.31	22.25
2	Drum phou	15.99	14.79	15.85	14.58	12.11	12.82

Table: 1b. The defatted undefatted Amylose content (%) of Jaya and Drum Phou rice varieties by using conical flask.

CONICAL FLASK							
Digestion duration (min)							
S. No	Rice Samples	0	2-3	10	20	30	60
Defatted Amylose (%)							
1	Jaya	28.87	29.39	28.33	27.91	28.00	27.46
2	Drum phou	17.81	17.93	17.61	15.94	16.53	16.69
Undefatted Amylose (%)							
1	Jaya	23.80	25.89	23.71	23.12	24.86	22.46
2	Drum phou	15.98	16.02	15.44	12.82	15.33	14.59

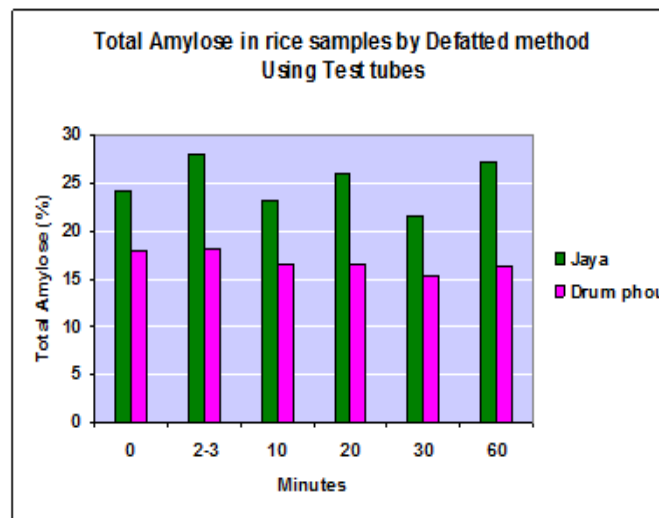


Fig.1

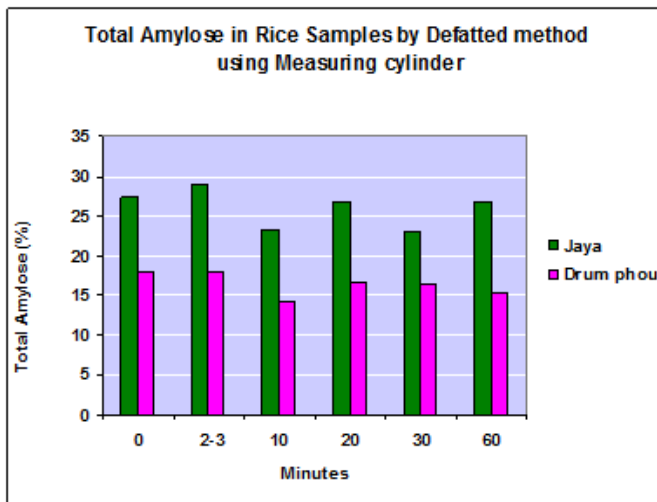


Fig.2

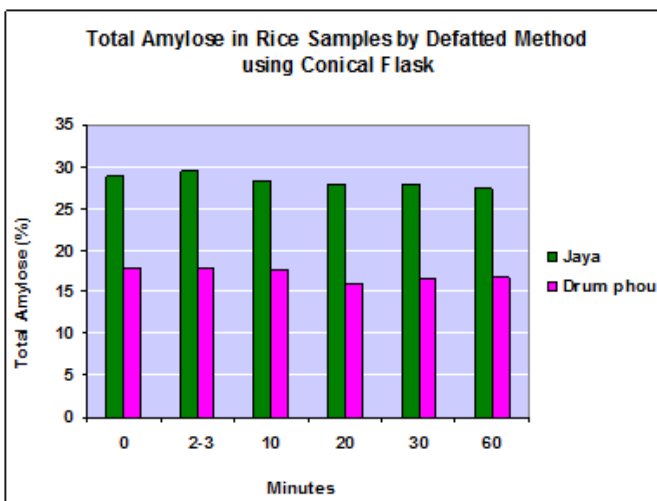


Fig.3

IV. CONCLUSION

Also, the comparison of results shows that, using of conical flask give better performance than test tubes. Hence, the overnight digestion using conical flask accompanied with 2-3min. boiling can be followed for better results compared to using of other glassware's like test tubes.

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