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RESEARCH ARTICLE

CHARACTERIZATION OF SEED PROTEIN OF SOME INDIGENOUS RICE (*ORYZA SATIVA* L.) CULTIVARS OF ASSAM.

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Abstract

Among the plant protein sources the seed play an important role owing to the presence of large amount of storage protein. Rice has the highest nutritional value among the cereal protein due to the high content of essential amino acid. Large number traditional cultivars in Assam are having high protein and essential amino acids content which is important for synthesize other some of the amino acids. Present study has been undertaken to characterize the seed protein of few indigenous cultivars of rice (*Oryza sativa* L.). All six (6) cultivars showed significant variation in total protein content, total amino acid, Methionine, Tryptophan Lysine & fibercontent. Total amino acid content showed positive correlation with protein content. In the present study, the cultivar having high grain protein show thicker bands in SDS -polyacrylamide gel electrophoresis than the cultivar with low protein content.

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Introduction:-

Rice is a vital food for more than half of the population of the world .Its importance increases with the increase in human population. This principal food crop is cultivated in more than 2.48 million hectare area in Assam. Large numbers of traditional cultivars are available in this region and they are very rich source of gene pool. Rice provides more calories per hectare than other cereal crops and its nutritional value is high among other cereal and grains. The genus *Oryza* listed a varying number of species mainly on the morphological consideration by Roschiviez (1931), Chevalier (1932) and Chatterjee (1948). Genetic variants, showing differences in composition of seed protein have been reported in many species and genera of higher plants. (Arulbalachandran and Mullainathan, 2009). The protein content of rice is considered to have the best amino gram, high digestibility, high biological value and best protein efficiency ratio. Rice protein is the main source of dietary protein and provided nearly 80% of total calories of Asian food. The protein content of milled rice varies from 5-17% (Juliano, 1970) which affect on cooking characteristics of rice. The level of protein in mature rice grain has been found to higher in some traditional rice cultivars of Assam. Seed protein usually remain unaffected due to environmental factor; therefore can be used as a criteria for characterization of cultivars at the molecular level (Naik & Kole,2002). Therefore an attempt has been made to study on Characterization of seed of some indigenous Rice (*Oryza sativa* L.) cultivars of Assam.

Materials and methods:-

Seeds of Six (6) Indigenous rice (*O.sativa* L.) cultivars were collected from Rice Research Station ,Titabar, Assam Agriculture University, Jorhat, Assam which are very popular among the farmers and widely cultivated . The cultivars are Cv. Rupahi, Cv.Sokuwa, Cv Itakhuli , Cv.Joha, Cv. Bora and Cv Jahingia .and are allow to grow in

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earthen pot to raise the plant. The matured seeds of each cultivars were subjected to biochemical tests for protein. Nitrogen content of matured seeds was estimated by Microkjeldhal method (AOAC, 1980). Protein content was obtained by multiplying nitrogen value by the factor 6.25.

Total free amino acid content, Methionine, lysine and tryptophan were estimated. Total free amino acid content was estimated by Sadasivam and Manickam (1996). Methionine was estimated by the Horn et.al (1946). Lysine was estimated by the method of Beckwith et.al. ((1975) and tryptophan was estimated by the method of Subramaniam et.al (1970). Seed proteins were characterized by SDS-PAGE outlined by Laemmli (1970). Manually husked grains were washed with distilled water and blotted dry. About 75mg kernels grounded with ice cold 0.3M ris (PH 6.5). The sample was homogenized and centrifuged at 8000 rpm for 10 minutes at 4°C. The supernatant was collected and sample weight to extract volume was adjusted to 1:5 ratios. The protein was resolved in 14% polyacrylamide gel and stained with Coomassie Brilliant Blue R-250. Protein Molecular was co-electrophoresed to determine the molecular weight of the individual sample and total number of individual band were counted for each cultivar.

Table 1:-Protein and amino acid content of six(6) rice (*O.sativa* L.) cultivars of Assam

Cultivars	Total protein Content (%)	Total free amino acid (%)	Methionine Content (%)	Tryptophan Content (%)	Lysine Content (%)	Fibre Content (%)
Cv. Rupahi	8.56	0.31	0.059*	0.028*	0.047*	0.75
Cv.Itakhuli	8.16	0.29*	0.061*	0.031*	0.052	0.90*
Cv.Sokuwa	7.03*	0.19*	0.079*	0.061*	0.038	0.64
Cv.Bora	8.77*	0.42*	0.056	0.029	0.056*	0.66*
Cv.Jahingia	7.04	0.21	0.064	0.053	0.048*	0.86*
Cv.Joha	6.92	0.26	0.076	0.069	0.043	0.61
CD at 5%	1.43	0.09	0.20	0.03	0.46	0.16

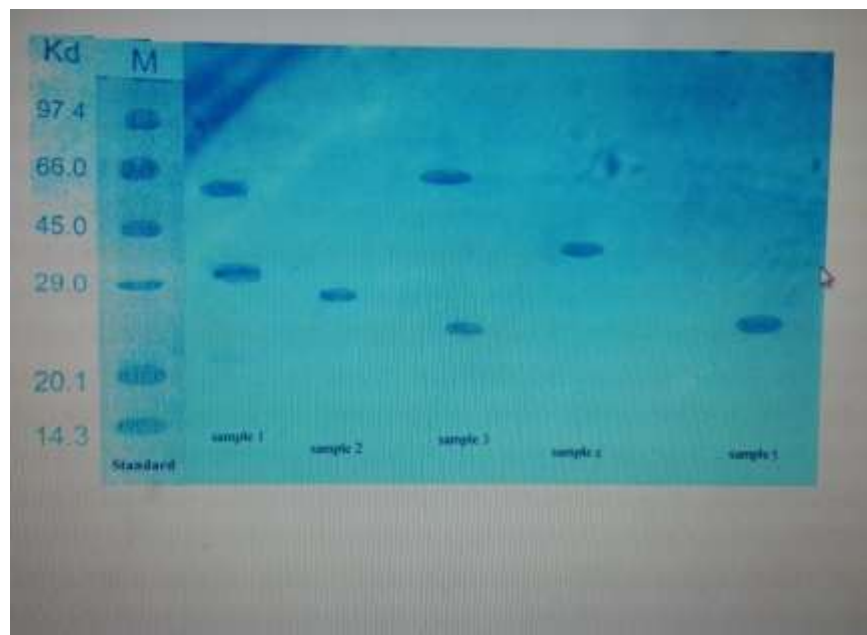


Fig :-SDS –PAGE of six (6) rice (*O.sativa* L.) cultivars of Assam.

Results and Discussion:-

Protein content of rice (*O.sativa* L) is considered to have the best aminogam, high digestibility, high biological value and best protein efficiency ratio. Rice protein is the main source of dietary protein and provided nearly 80% of total total calories of Asian food. Protein content in milled rice varies from 5-14% with as much as 6% within the range being due to environmental .The protein content is one of the factors which can affect n cooking characters of rice. All the six (6) indigenous rice cultivars show high protein content and show variation in protein content. Highest

value of protein content was recorded in the Cv. Bora and lowest was recorded in the cultivar Cv.joha which were recorded as 8.77% and 6.92% respectively (Table-1)

Total free amino acid content varies from 0.19 % to 0.42 % and it was in the Cv.Sokuwa & Cv.Bora respectively. The cultivars having high amount of protein show high amount of free amino acid .Amino acid is the building block of protein so an increased amount of protein is also expected to be reflected in amino acid content and high amount of amino acid will contribute to the faster and greater accumulation o protein in the protein bodies (Perez, et.al., 1973).High amount of protein had higher amount o free amino acid than their low protein component (Cagampang et.al., 1971). Methionine content of six (6) cultivars varies from 0.56 % to 0.79 % and maximum was observed in Cv. sokuwa. The tryptophan content was maximum in the Cv. Joha & minimum in the Cv.Rupahi which was recorded as 0.69% and 0.28% respectively (Table1).The present study reflects positive correlation of lysine content with the grain protein content. Maximum lysine content was 0.56 % and minimum 0.38 % was recorded in Cv.Bora and Cv.sokuwa respectively.

Differences in protein in high and low protein containing cultivars also show difference in SDS -polyacrylamide gel electrophoresis. Total number of bands in the SDS-PAGE ranged from 1 to 3 .The maximum of three (3) bands was observed in the Cv Rupahi and minimum one (1) was in the Cv. Bora and Cv Itakhuli. In the Cv. Joha and Cv. Jahingia the SDS PAGE show two (2) bands each. On the basis of the thickness protein bands were categorized into thick, medium, thin and faint bands. The present study indicates that different cultivars can be distinguished on the basis of the total number of bands as well as thickness of the bands. The Cv. Bora and Cv. Joha show a single but thick band; In case of Cv. Sokuwa no visible band appeared which may be due to the presence very low amount of soluble protein. The cultivar having high grain protein show thicker bands than the cultivar with low protein content. (Fig 1)

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