AATCC Review

29 October 2024: Received
24 January 2025: Revised
16 February 2025: Accepted
19 February 2025: Available Online

https://aatcc.peerjournals.net/

Original Research Article

Open Access

Shelf Life Studies of Quick Cooking Dhal (QCD) Developed From Pjtsau Red Gram Dhal Varieties

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ABSTRACT

The present study was undertaken to estimate the shelf life studies of quick cooking dhal (QCD) developed from PJTSAU red gram dhal varieties i.e., TDRG-4, RGT-1 and WRG-122. The storage stability of the dhals were studied by analyzing moisture, free fatty acids and peroxide values for 6 months (180 days) using standard procedures on 0th day, 90th day and 180th day. All the three varieties of university i.e., TDRG – 4, RGT – 1 and WRG – 122 are suitable for preparation of quick cooking dhal, a convenience product.

Keywords: *Quik cooking dhal, Red gram dhal, Shelf life, Free fatty acids, Peroxide value,Moisture and Storage.*

INTRODUCTION

Among legumes, Pigeon pea (*Cajanuscajan L.*) is predominantly grown and consumed in India. It is also known as red gram, arhar, tur dhal which belongs to family Leguminosae. It is the second most important pulse in the country and also grown in some East African and south Asian countries. India is the largest producer (81.49 %) and consumer of pigeon pea in the world. Pigeon pea accounted for about 20 % of the total production of pulses in the country during the year 2000-2001. Other major pigeon pea-producing countries are Myanmar (10.02 %), Malawi (2.64 %) and Uganda (2.60 %). The productivity is highest in Uganda (1000 kg/ha) followed by Nepal (875 kg/ha) and India (728 kg/ha).

Despite the nutritional potential of the legumes, they are underutilized as food. In India, several seed legumes have been traditional supplements [either in the form of splits[1] or whole legume] to staple cereals [cooked rice, chapattis and poories] [2]. Legumes and cereals have complementary nutritional effects and their consumption together fulfills the need of balanced protein. The nutritive value of legumes depends upon the processing methods, presence or absence of anti-nutritional or toxic factors and possible interaction of nutrients with other food components.

Because pulses are an important source of proteins, calories and vitamins, they have the potential to alleviate protein-energy malnutrition [1]. However, the consumption of pulses is impaired by two factors. Firstly the naturally occurring anti-nutritional factors and secondly the hard-to-cook (HTC) defect which develops when they are stored at high temperature and humidity conditions. The cooking process not only improves the palatability of pigeon pea but it destroys or minimizes some anti-nutritional factors [3]. Pulses with hard-to-cook defects require extended time to cook and have decreased protein, starch, vitamin availability and poor textural quality which ultimately reduce the consumer preference and acceptability.

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DOI: https://doi.org/10.21276/AATCCReview.2025.13.01.409

MATERIALS AND METHODS

The red gram dhal varieties i.e., TDRG-4, RGT-1 and WRG-122 were packed in HDPE covers and stored in ambient temperatures. The storage stability of the dhals were studied by analyzing moisture (IS:4333(part-1)-2017), free fatty acids and peroxide values (IS:548(part-1)-1964) for 6 months (180 days) using standard procedures on 0th day, 90th day and 180th day.

RESULTS AND DISCUSSION

Moisture content of Raw and QCD Red Gram varieties during storage (0th to 180 days) was presented in Table 1. Results found that WRG-122 raw variety had highest moisture content compared to in raw TDRG-4 and RGT-1 varieties from 0th day to 180 days of storage. While TDRG-4 QCD showed highest moisture content on 0th day and 90th day, however RGT-1 QCD variety showed highest moisture content on 180th day compared to TDRG-4 and WRG-122 Varieties. Normally, pulses contain 15% of moisture content during storage conditions.(Indian Grain Storage Management & Research Institute).

From the table 1, it indicates that the moisture content was decreased in all red gram varieties during storage both in raw and QCD form. i.e., TDRG-4 Raw dhal moisture decreased from 8.51 g/100g on 0th day to 7.81g/100g on 90th day and 7.77 g/100g on 180th day. While, TDRG-4 QCD dhal moisture content was decreased from 9.26 g/100g on 0th day to 8.76 g/100g on 90th day and 8.50 g/100g on 180th day. Further, RGT-1 Raw dhal moisture content was decreased from 8.52g/100g on 0th day to 8.01g/100g on 90th day and 8.03g/100g on 180th day. Furthermore, RGT-1 QCD dhal moisture decreased from 8.79g/100g on 0th day to 8.29g/100g on 90th day and 8.88g/100g on 180th day. While, WRG-122 Raw dhal moisture decreased from 10.62g/100g to 10.04g/100g on 90th day and 9.96g/100g on 180th day. WRG-122 QCD dhal decreased from 8.87g/100g on 0th day to 8.24g/100g on 90th day and 8.30g/100g on 180th day. Statisstically,nosignificant difference was noticed up to storage period of 180 days.

Table 1: Moisture content of Raw and QCD Red Gram (0 to 180 days)

Nutrient	TDRG-4 - Raw	TDRG-4 - QCD	RGT-1- Raw	RGT-1 - QCD	WRG-122-Raw	WRG-122-QCD	F -VALUE	P-VALUE
	0th day						57.88	4.67NS
Moisture g/100g	8.51	9.26	8.52	8.79	10.62	8.87		
	90th day							
Moisture g/100g	7.81	8.76	8.01	8.29	10.04	8.24		
	180th day							
Moisture g/100g	7.77	8.50	8.03	8.88	9.96	8.30		

Note: NS: Not significant

Table 2: Free Fatty Acid (as oleic acid) content of Raw and QCD Red Gram (0 to 180 days)

Nutrient	TDRG-4 - Raw	TDRG-4 - QCD	RGT-1- Raw	RGT-1 – QCD	WRG-122- Raw	WRG-122- QCD	F - VALUE	p- VALUE
	0th day						6.66	0.00**
Free Fatty Acid (as Oleic Acid) g/100g	0.57	0.42	0.54	0.50	0.66	0.48		
	90th day							
Free Fatty Acid (as Oleic Acid) g/100g	0.67	0.51	0.72	0.62	0.80	0.61		
	180th day							
Free Fatty Acid (as Oleic Acid) g/100g	0.73	0.65	0.98	0.81	0.98	0.96		

*Note:**p<0.01 Highly significant*

Free Fatty Acid (as oleic acid) content of Raw and QCD Red Gram (0 to 180 days) was presented in Table 2. The free fatty acid content was increased in both raw and QCDs of red gram dhal varieties during storage, this may be due to change in fiber content. Among all WRG-122 raw and RGT-1 variety showed highest Free Fatty Acid (as oleic acid) content (0.98 g/100g) compared to TDRG-4 and RGT-1 raw varieties, while the while, WRG-122 QCD had high free fatty acid content (0.96 g/100g) compared to TDRG QCD and RGT-1 QCD. From the results it clearly showed that, TDRG-4 Raw free fatty acid content was increased from 0.57g/100g on 0th day to 0.67g/100g on 90th day and 0.73g/100g on 180th day. Further, TDRG-4 QCD free fatty acid content was also increased from 0.42g/100g on 0th day to 0.51g/100g on 90th day and 0.65g/100g on 180th day. RGT-1 Raw free fatty acid content increased from 0.54g/100g on 0th day to 0.72g/100g on 90th day and 0.98g/100g on 180th day. RGT-1 QCD free fatty acid content increased from 0.50g/100g on 0th day to 0.62g/100g on 90th day and 0.81g/100g on 180th day. WRG-122 Raw free fatty acid content increased from 0.66g/100g on 0th day to 0.80g/100g on 90th day and 0.98g/100g on 180th day. WRG-122 QCD free fatty acid content increased from 0.48g/100g on 0th day to 0.61g/100g on 90th day and 0.96g/100g on 180th day.Statiscally (p0.1) difference was found among peroxide content of raw and QCD red gram from 0th day to 180 days. The present findings of the study was on par with the study conducted by Karolkowski*et al.*,2021 and found the free fatty acids content of pulses viz. black bean,kidney bean,pea,chickpea,and faba bean are 0.27,0.46,1.17,2.93 and 0.68 g/100g respectively.

Table 3: Peroxide value content of Raw and QCD Red Gram (0 to 180 days)

Nutrient	TDRG-4 - Raw	TDRG-4 - QCD	RGT-1- Raw	RGT-1 – QCD	WRG-122- Raw	WRG-122- QCD	F - VALUE	p - VALUE
	0th day						11.66	0.00**
Peroxide value meq/100g	0.96	6.85	1.58	4.09	1.55	7.52		
	90th day							
Peroxide value meq/100g	1.16	7.22	1.83	4.75	1.67	7.98		
	180th day							
Peroxide value meq/100g	1.69	7.93	2.31	5.27	3.38	8.14		

*Note:**p<0.01 Highly significant*

The peroxide values of Raw and QCD Red Gram dhals was presented in Table 3. The peroxide was increased in both raw and QCDs of red gram dhal varieties during storage. While, WRG-122 raw (3.38 meq/100g) and QCD (8.14 meq/100g) had high peroxide value compared to TDRG and RGT-1 varieties.

Results showed that peroxide content in TDRG-4 QCD. TDRG-4 Raw peroxide value increased from 0.96meq/100g on 0th day to 1.16meq/100g on 90th day and 1.69meq/100g on 180th day. TRDG-4 QCD peroxide value increased from 6.85meq/100g on 0th day to 7.22meq/100g on 90thday and 7.93meq/100g on 180th day. RGT-1 Raw peroxide value increased from 1.58meq/100g on 0th day to 1.83meq/100g on 90th day and 2.31meq/100g on 180th day. RGT-1 QCD peroxide value increased from 4.09meq/100g on 0th day to 4.75meq/100g on 90th day and 5.27meq/100g on 180th day. WRG-122 Raw peroxide value increased from 1.55meq/100g on 0th day to 1.67meq/100g on 90th day and 3.58meq/100g on 180th day. WRG-122 QCD peroxide value increased from 7.52meq/100g on 0th day to 7.98meq/100g on 90th day and 8.14meq/100g on 180th day.

Statistically ($p<0.01$) significant difference was found among pulses from 0^{th} day to 180 days.

CONCLUSION

Quick cooking dhal may be suitable for commercial marketing if the experiment is tried on a large scale along with addition of green leafy vegetables etc. TDRG – 4 variety raw and QCD had excellent aroma, while cooking which lasted long. All three varieties of university i.e., TDRG – 4, RGT – 1 and WRG – 122 are suitable for preparation of quick cooking dhal, a convenience product.

ACKNOWLEDGEMENT

The authors thank honorable Vice-chancellor, Director of Research, University Head and Unit Coordinator - AICRP of Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad for their encouragement.

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