Electronic Journal of Plant Breeding, 8(4): 1053-1058 (Dec 2017) DOI: 10.5958/0975-928X.2017.00156.9
ISSN 0975-928X

Research Article

CO 8 : A high yielding long duration new red gram variety suitable for Tamil Nadu

J. R. Kannan Bapu, A. Thanga Hemavathy*, N. Nadarajan, A.R. Muthiah, D. Packiaraj, D. Malarvizhi, K. Ganesamurthy, E.Rajeswari and D.Rajabaskar
Department of Pulses, CPBG, Tamil Nadu Agricultural University,Coimbatore-641003
E.mail: *hemavathytnau@gmail.com

(Received: 23 Sep 2017; Revised: 6 Dec 2017; Accepted: 6 Dec 2017)

Abstract
A high yielding redgram culture CRG 10-01 was a cross derivative of APK 1x LRG 41 and matures in 170 to 180 days. The culture recorded an average grain yield of 1600 kg/ha under rainfed condition and 1800 kg/ha under irrigated condition with a yield increase of 19 percent over CO 6 and 22 percent over VBN 2. Drought tolerant CO 8 variety shown resistance to Sterility Mosaic Disease, root rot and moderately resistant to pod borer complex. This culture CRG 10-01 is released as CO 8 redgram for general cultivation in Tamil Nadu during 2017. The variety notification proposal has been submitted to the PPV&FRA with DNA finger printing profile for approval.
.

Key words
CO 8, New Redgram variety, Long duration, DNA profile

Introduction

Redgram is one of the most important grain legumes in India with 90% of global production confined within the country. This crop is highly suitable crop for rainfed agriculture and needs minimum inputs and produces reasonable yields even under unfavorable agro-ecological conditions (Saroj *et al.*2015). Its seeds contain about 20-22% protein and reasonable amounts of essential amino acids. Its rainfed ecosystem, high protein content and multiple uses make it an ideal crop all smallholder farmers (Saxena.K.B. 2008). In redgram long duration variety CO 6 was released during the year 1991. Despite the fact that there is no high yielding long duration varieties are available, this will stagnate the production status of red gram now a days. The culture CRG 10-01 is a high yielding long duration culture which is resistant to SMD and root rot diseases and moderately tolerant to pod borer complex. Redgram CRG 10-01 culture is drought tolerant and desirable quality traits. Hence this culture can be recommended to release as CO 8 during Adipattam for all the districts of Tamil Nadu.

Materials and Methods

Hybridization programme was made by using two varieties APK 1 and LRG 41.The selection of redgram culture CRG 10-01 was made during 2008 and tested in Preliminary Yield Trail and Comparative yield trails during kharif 2009 to Kharif 2011. This culture was proposed and tested in Multi Location Trails at Vamban, Coimbatore, Paiyur , Melalathur and Yethapur during kharif 2012. It was promoted to Adaptive Research Trails for three years during 2013-14, 2014-15 and 2015-16. The performance was tested in 185 locations of farmer's field at different districts of Tamil Nadu. Simultaneously, it was evaluated in the All India Co-ordinated Trials during kharif 2011under Initial Varietal Trial (IVT) in central and southern zone. Field screening was also carried out for its pests and diseases reaction.

Results and Discussion

The overall performance of the redgram culture CRG 10-01 was presented in Table 1. In the station trails conducted from *Kharif* 2008 to *Kharif* 2010 the culture recorded mean grain yield of 2170 kg/ha which was 26.67 percent increase over CO 6 and 40.54 per cent increase over VBN 2. Multi Location trails were conducted during *kharif* 2012, this culture recorded a mean grain yield of 1156 kg/ha with 10% increase over CO 6 (Table 2). CRG 10-01 was tested under Adaptive Research Trail during *kharif* 2013-14, 2014-15 and 2015-16 in the farmers field of all districts of Tamil Nadu. Under 181 locations over three years of ART testing CRG 10-01 recorded 1149 kg/ha with 11.55 per cent and 17.96 per cent increased yield over CO6 and VBN 2 respectively (Table 3).

CRG 10-01 also tested in AICRP-Pigeonpea (All India Coordinated project for Pigeonpea) under Initial Varietal Trail (IVT) in central and southern zone during *kharif* 2012-13. The culture recorded the grain yield of 1751 kg/ha in central zone which is 14.97 per cent increased yield over BDN 2 (1523 kg/ha) (Table 4). In south zone CRG 10-01 recorded highest yield of 1840 kg / ha which is 50% increased yield over CO 6 (896 kg/ha) in Lam.(Table 5).

Twenty On farm trials were conducted at Krishnagiri (10 nos.), Vellore(5 nos.) and Coimbatore(5 nos.) districts. 10 to 24% of yield increase was noted compared with check. (Table 6). As per the guidelines from PPV and FRA, New Delhi distinguishing morphological characters of the culture CRG 10-01 was formulated and compared with the check variety CO 6. (Table 7). CRG 10-01 have green with brown streaks pods

and creamy brown seeds and seeds are bold with 100 seed weight of 10.22 to 11.44 gram

The reaction against pests and diseases for the culture CRG 10-01 along with the check CO 6 was presented in Table 8. This culture is resistant to Sterility mosaic disease and Root rot and moderately tolerant to pod borer complex.

The results of the organoleptic evaluation of the dhal also revealed the superiority of this culture with the overall acceptability score of 9 (Table 8).

Hence based on the superiority of the redgram culture CRG 10-01, this has been recommended for release by Crop Scientists Meet – Pulses 2016 by TNAU, Coimbatore. Hence the culture CRG 10-01 has been recommended for release as CO 8 by SVRC for *adipattam* in all the districts of Tamil Nadu.

Variety notification proposal for the CO 8 was submitted to the PPV & FRA with DNA finger printing data. DNA finger printing of Pigeonpea variety CO 8 was done along with popular varieties *viz.*, CO(Rg) 7, CO 6, and pre released cultures CRG 12-20, CRG 13-01 and CRG 13-007 using Pigeonpea specific SSR primers. A total of ten SSR primers viz., CcM0974, CcM0538, CcM039, CcM0246, CcM0492, CcM0494, CcM0252, CcM 2977, ICPM1E0, CCM008 were used for DNA profiling. Out of this, one primer CcM0974 was found to be polymorphic and clearly differentiated CO8 with other genotypes. The marker CcM0974 produced a product size of 170 bp in CO 8 and 175 bp in other genotypes evaluated.(Fig.1)

References

Saroj.S.K., Singh M.N. and Yashpal 2015. Inheritance study of pollen fertility restoration in

pigeonpea. Electronic *Journal of Plant Breeding*.**69**(1):81-86.

Saxena,K.B. 2008.Genetic improvement of Pigeonpea. A Review. *Tropical plant biology*,**I.** 159-178.

Electronic Journal of Plant Breeding, 8(4): 1053-1058 (Dec 2017) DOI: 10.5958/0975-928X.2017.00156.9
ISSN 0975-928X

Table 1. Overall performance of the redgram culture CO 8

SI.No.	Trials	Year	Locations	Yield (kg/ha)			
				CRG 10-01	CO 6(C)	VBN 2(C)	BDN 2(C)
1	Station trails	2008-2010	3	2170	1713	1544	
2	MLT	2012	5	1156	1056	932	
3	ART	2013-2015	181	1077	968	943	
4	OFT	2014	20	1331	1001	978	
5.	AICRP trials						
	IVT- Central zone	2012	9	1751			1523
	IVT- South zone	2012	7	1233	1166		

Table 2. Performance of CO 8 in MLT (Kharif, 2012)

Sl. No	Name of the place	Grain yield kg/ha	
		CORG 10-01	Co 6
1	Vamban	934	1003
2	Coimbatore	1157	872
3	Paiyur	1519	1275
4	Melalathur	1323	1212
5	Yethapur	845	920
	Mean	1156	1056
Percent increase over the check %			9.46%

Table 3. Overall performance of CO 8 in ART (2013-14, 2014-15 & 2015-16)

SI.No.	District(s)	CRG 10-01	CO 6 (Check)	VBN 2 (Check)
1.	Krishnagiri (14)	959	936	870
2.	Madurai(13)	1075	988	978
3.	Sivagangai (10)	1028	836	964
4.	Theni (17)	892	1033	666
5.	Virudhunagar(18)	893	812	809
6.	Coimbatore (12)	1007	895	831
7.	Perambalur(12)	820	749	765
8.	Trichy (10)	1132	928	910
9.	Pudukottai (12)	1132	1010	1009
10.	Karur(6)	1297	1168	1137
11.	Dharmapuri(12)	1161	1026	1015
12.	Erode (12)	1177	1037	1101
13.	Tirunelveli (6)	1374	1266	1283
14.	Viruddachalam(1)	1284	1168	953
15.	Tindivanam (3)	2199	1810	1640
16.	Salem(6)	1030	983	884
17.	Vellore(7)	1147	844	809
18.	KVK sirugamani(4)	1338	1187	925
19.	Nammkal(6)	1025	998	994
20.	Virinjipuram kvk (4)	1010	936	930
	Mean (kg/ha) (For 185 locations)	1149	1030	974
			11.55	17.96

Table 4. Performance of C0 8 in AICRP- IVT during kharif 2012-13 in central zone

Sl.No	Location	Grain yield kg/ha	
		CO 8	**BDN 2(Check)**
1	Badnapur	1240	926
2	Khargone	1995	1780
3	Sehore	2084	2106
4	Junagadh	2063	1340
5	S.K.Nagar	1745	1343
6	Akola	1418	1364
7	Bharuch	1301	1278
8	Pachora	2641	2569
9	Navsari	1278	1002
Mean		1751	1523
Percentage increase over check			14.97%

Table 5. Performance of CO 8 in AICRP -IVT during kharif 2012-13 in south zone

SI.No.	Name of the Place	Grain yield kg/ha	
		CO 8	**CO 6(Check)**
1	Coimbatore	916	1013
2	Warangal	1139	1093
3	Vamban	1216	772
4	Bangalore	1330	1399
5	Lam	1840	896
6	Berhampur	1090	1501
7	Tandur	1104	1494
	Total	1233	1166
			6%

Electronic Journal of Plant Breeding, 8(4): 1053-1058 (Dec 2017) DOI: 10.5958/0975-928X.2017.00156.9
ISSN 0975-928X

Table 6. Distinguishing morphological characters of the culture CO 8 (as per PPV & FRA)

SI.No.	Characteristics	CRG 10-01	CO 6(Check)
1	Plant anthocyanin coloration of hypocotyls	Absent	Absent
2.	Plant –branching pattern	Erect	Erect
3.	Time of flowering	Medium (120-130 days)	Medium (120-130 days)
4.	Plant growth habit	Indeterminate	Indeterminate
5.	Stem colour	Green with brown stripes	Green
6.	Leaf shape	Oblong	oblong
7.	Leaf: Pubescence on lower surface of the leaf	absent	absent
8.	Flower: Colour of base of petal (Standard)	Yellow	Yellow
9.	Flower: Pattern of streaks on petal (standard)	Medium	Medium
10.	Pod : Colour	Green with brown streaks	Green with purple streaks
11.	Pod: Pubescence	Present	Present
12.	Pod: Waxiness	Absent	Absent
13.	Pod: Surface stickiness	Present	Present
14.	Pod: constriction	Prominent	Prominent
15.	Pod size(cm)	5.3-6.0	5.1
16.	Pod: No. of seeds	5-6	4-5
17.	Plant height	Tall (165-180 cm)	Tall (160-180cm)
18.	Seed colour	Creamybrown	Brown
19.	Seed: colour pattern	Uniform	Uniform
20.	Seed shape	Globular	Globular
21.	Seed :Size (100 seed weight)	Large (10.22 to 11.44g)	Medium (7.6 to 8.8g)

Table 7. Reaction of CO 8 to pests and diseases

SI.No.	Entries	Podfly (grain damage)	Pod borer Maruca	Sterility mosaic virus (%)	Root rot (%)
		Pest susceptibility Index			
1	CRG 10-01	3	4	7.3	9.5
2	CO 6 (Check)	5	5	63	65
3	VBN 2 (Check)	5	5	65	65

Table 8. Organoleptic evaluation of the dhal

Characteristics	CO 8	CO 6
Organoleptic Testing		
Color and acceptance	9	8
Flavour	8	7
Texture	9	6
Taste	9	7
Overall acceptability	9	7
Physical characters		
Length (cm),	0.6	0.5
breadth(cm),	0.5	0.5
thickness(cm),	0.15	0.18
100 dhal weight of dhal (gm)	4.25	4.67
Chemical Properties		
Moisture	8.1	8.62
Ash	4.96	4.46
Starch g	50.6	49.5
Protein g	23.11	22.68
Fat g	0.92	0.88
Crude Fiber g	1.1	1.2
Calcium (mg)	65	68
Phosphorous (mg)	280	288
Cooking quality		
Cooking time (min.),	12	15
Water absorption %	88	91

Electronic Journal of Plant Breeding, 8(4): 1053-1058 (Dec 2017) DOI: 10.5958/0975-928X.2017.00156.9
ISSN 0975-928X

Fig.1. Field View of Redgram CO 8

Single plant of CO8