Electronic Journal of Plant Breeding, 10 (3): 1250 - 1254(Sep 2019) DOI: 10.5958/0975-928X.2019.00159.5
ISSN 0975-928X

Research Article

ADT 6 - A high yielding blackgram variety suitable for rice fallow condition of cauvery Delta Zone

P. Shanthi, K.Iyanar, D. Sassikumar, R. Suresh, R. Manimaran, R. Pushpa,V. Ravi, K. Subrahmaniyan, S.Suresh and K. Rajappan
Tamil Nadu Rice Research Institute, Aduthurai, Thanjavur – 612 101
E-Mail : dsassikumar@gmail.com

(Received: 22 June 2019; Revised: 29 Sep 2019; Accepted: 30 Sep 2019)

Abstract
A high yielding blackgram variety ADT 6 suitable for rice fallow season of Cauvery Delta Zone was released during 2017. The variety ADT 6 (ADBG 13004) is a cross derivative of VBN 1 x VBG 04-006 and matures in 65-70 days. The plant type is semi erect and determinate. The seeds are bold, black oval in shape with dull lustre and the mean 100 seed weight is 4.7 g. The variety manifests good battering and recorded an average of 21.6 per cent protein and 5.7 % arabinose content. The average yield of ADT 6 is 741 kg/ha which is 13.8 per cent increased yield over ADT 3(651 kg/ha). The culture possesses moderate resistance to Mungbean Yellow Mosaic Virus (MYMV), leaf crinkle and powdery mildew diseases. The variety is fast spreading among the farmers of Cauvery Delta as a rice fallow blackgram variety.

Key words
Blackgram, Rice Fallow, ADT 6, Cauvery Delta Zone.

Introduction

Blackgram and greengram have unique role in diversifying Indian agriculture and defeating malnutrition in vegetarian population of the country. Blackgram in India occupies 4.83 million hectares with a production of 3.36 million tonnes. In Tamil Nadu Blackgram is being cultivated in an area of 4.3lakh hectares with a production of 3.11 lakh tonnes and a productivity of 723 kg/ha. (Project Coordinators Report, 2018-19). The major share of blackgram in Tamil Nadu in terms of area and production comes from the Cauvery Delta Zone (CDZ).In New delta areas of CDZ, blackgram area is improving as an alternative crop to rice- rice ecosystem. Districts such as Thanjavur, Tiruvarur, Nagapattinam and parts of Trichy and Cuddalore occupy 47 per cent area and 53 per cent of the total production of the state.

Pulses are cultivated in a unique system known as "rice fallow pulse" regularly after the *Samba* rice crop from January onwards in the CDZ.In rice fallow system of CDZ,blackgram seeds are broadcasted in the paddy fields7-10 days before the harvest of paddy under zero tillage condition. The germinated pulse crop withstands the disturbances during the harvesting of rice crop and grows well under paddy stubbles, survives with the residual moisture held by the clayey alluvial soil. It also effectively utilizes the dew prevalent during its growing period of 60 to 65 days that coincides with the winter season. Area under rice fallow condition in the CDZ accounts for 30.75 per cent and there is a possible expansion of area under blackgram to an extent of nearly two lakh hectares especially under rice fallow conditions.

The productivity under rice fallow system is lower than the state average (400 kg / ha) as compared to irrigated pure cropping system in CDZ. The blackgram variety ADT3 released during 1982 is still under cultivation which led to deterioration of genetic potential of the variety. Moreover, there is no alternate variety suited for rice fallow condition. Hence, there is an urgent need to develop a new variety suitable for rice fallow tracts in the CDZ. In this connection, efforts were made constantly to develop a new blackgram variety suitable for rice fallow condition

Materials and Methods

To develop a variety suitable for rice fallow condition of CDZ, hybridisation was effected during *Kharif*2009 at Agricultural Research Station, Pattukottai. The cross VBN 1 x VBN04-006 was done by hand emasculation and pollination.The F_1 was identified during *Rabi* 2009 and subsequent generation advancement by selection of elite plants with desirable features was made by adopting pedigree method of selection. In *Kharif* 2012, the homozygous culture ADBG 13004 was fixed in the F_6 generation.

In the rice fallow season of 2012-13, the homozygous culture ADBG 13004 was evaluated as Preliminary Row Trial at Tamil Nadu Rice Research Institute, Aduthurai. The culture was

evaluated along with checks and other entries for three year sunderrice fallow condition at Aduthurai. Among them, ADBG 13004 was found to be record superiority over other entries and hence nominated for MLT during 2015-16for state and national level (MULLaRP). The culture ADBG 13004 was also evaluated in the farmers field as On Farm Trial during 2015-16 rice fallow season. The culture was also subjected to screening for major pest and diseases at MLT stage and scoring of pest and diseases were recorded as per the standard procedure. The grain quality parameters *viz*., physical, chemical and battering quality was assessed by adopting standard estimation protocols at Home Science College and Research Institute, Madurai.

Results and Discussion

The blackgram variety ADT 6 is a semi erect plant with hairy pods. The stem has purple splashes and slight hairs. The plant habit is determinate and can grow an average height of 35-40 cm. The genotype matures in 65-70 days, possess broad lanceolate terminal leaflet and yellow colour flowers. The seed is oval, black in colour with dull lustre. The 100 seed weight is 4.5-4.7 g. (Table 1).

The variety ADT 6 in four years of station trials under rice fallow condition has given an average yield of 789 kg/ha which is 18.80 per cent higher yield than the standard check variety ADT 3 (664 kg/ha). Due to its yield superiority and higher protein content(21.6%), the culture was nominated simultaneously to MLT and AICRP evaluation during 2015(Table 2). In AICRP –MULLaRP *Rabi* trials conducted during 2015-16 in South Zones(8 locations), the variety ADT 6 recorded 2.86 and 11.88 % yield increase over the Zonal checks of LBG752 and LBG 645, respectively with the seed yield of 1039 kg / ha. In MLT during *Kharif* 2015, the culture ADBG 13004 has out yielded the checks CO (BG) 6 and VBN 6 by 5.2 and 6.4 per cent, respectively by recording an average grain yield of 803 kg /ha in six locations. In *Rabi* MLT 2015-16, the culture ADBG 13004 recorded 811 kg/ha which is 19.26 percent higher than VBN 6.

In *rice fallow*2015-16, it was tested in 38 locations as On Farm Trials in five districts *viz*.,Thanjavur, Thiruvarur, Nagapattinam, parts of Cuddalore and Thoothukudi.The cultureADBG13004 recorded a yield of 543kg/ha to 894kg/ha as against the check ADT 3(508 kg/ha to 818kg/ha) among various locations (Table 3). The overall results revealed that the culture ADBG 13004 had registered remarkably higher mean grain yield of 741 kg / ha against the check ADT3 (651 kg / ha) in rice fallow condition. The per cent increase in grain yield over the check variety namely ADT 3 was recorded as 13.8(Table 2).

The variety ADT 6 had shown moderate resistant reaction to Powdery Mildew disease which is more prevalent in the rice fallow season(Table 4) and manifest moderate resistance to Yellow Mosaic Virus, a vector (whitefly) mediated viral disease that occurs normally during summer and *kharif* season. The pod borer attack and shot hole symptoms were found lesser in ADT 6 than the check variety ADT 3.

The variety ADT 6 is good in making dishes like vada, idly due to its high batter volume producing capacity than ADT 3. It produces 900 ml batter volume after fermentation against 750 ml (ADT 3). The variety is nutritionally rich with high protein content (21.6%) and arabinose content (5.7 %) compared to ADT 3 (Table 5).

The rice fallow blackgram variety ADT 6 was released during 2017 for cultivation in the Cauvery Delta zone and notified with No.S.O.1379(E) during 2018 for seed production.

Table 1. Descriptor of blackgram culture ADBG 13004

Habit		
Plant growth habit	:	Semi erect
Plant habit	:	Determinate
Stem characters		
Stem colour	:	Green with light purple splashes
Stem pubescence	:	Present – Light hairy
Leaf characters		
Shape of leaf pinnae	:	Broad to narrow lanceolate terminal leaflet
Colour of the leaf	:	Green
Leaf pubescence	:	Present- light hairy
Petiole colour	:	Green with light purple splashes
Pod characters		
Pod colour: intensity of colour of premature pods	:	Green
Pod pubescence	:	Present
Pod colour at maturity	:	Black
Seed characters		
Seed colour	:	Black
Seed lusture	:	Dull
Seed shape	:	Oval
Agronomic traits		
Days to 50% flowering	:	35-40 days
Days to maturity (days)	:	65-70 days
Plant height (cm)	:	35-40 cm
Seeds per pod	:	7-8
100 seed weight (g)	:	4.7g
Single Plant Yield (g)	:	9.0g

Table 2. Overall performance of Blackgram Culture ADBG 13004 in various trials

Trials	**No. of trials /Locations**	**Yield kg/ha**					
		ADBG 13004	**ADT 3**	**CO(Bg) 6**	**VBN 6**	**LBG 752 (Ch)**	**LBG 645 (Ch)**
Rice fallow- Research Station(2012-13 to 2015-16)	4	789	664				
Rice fallow – OFT (2015-16)	38	692	637				
MLT- *Kharif (2015)*	6	803		754	763		
MLT- *Rabi (2015-16)*	4	811		829	680		
AICRP-*Rabi* (2015-16)	8	1039				1011	929
Mean		827	651	792	722	1011	929
Weighted mean including AICRP	**60**	**764**	**637**	784	730	-	-
Per cent yield increase(Overall)			19.4 kg	-	4.66	-	-
Rice fallow- Average	**42**	**741**	**651**	-	-	-	-
Per cent increase over ADT 3			**13.82**	-	-	-	-

Table 3.Performance of ADBG 13004 in OFT under rice fallow conditionin CDZ during 2015-16

Sl. No.	Districts	Locations	Grain yield (kg / ha)	
			ADBG13004	ADT3
1	Thiruvarur	14	664	617
2	Thanjavur	8	703	641
3	Nagapattinam	12	705	647
4	Cuddalore	3	750	690
5	Thoothukudi	1	654	592
		Over all Mean	692	637
		Per cent increase over ADT 3		8.64

Table 4. Reaction of ADBG 13004 against major diseases and Pests at TRRI, Aduthurai

Sl. No	Season & Year	YMV		Leaf crinkle		Powdery mildew		Pod borer (%)		Shot hole (%)	
		ADBG 13004	ADT3	ADBG 13004	ADT 3	ADBG 13004	ADT3	ADBG 13004	ADT3	ADBG 13004	ADT3
1.	Rice fallow 2014-15	4	4	6.5	11.60	11.60	3	11.60	18.24	23.73	22.52
2.	*Rice fallow 2015-16*	4	5	7.2	6.81	6.81	3	6.81	9.36	30.10	41.24

Table 5. Quality parameters of blackgram culture ADBG 13004

Characteristics	Name of variety/culture	
	ADT3	ADB 13004
Physical characters		
Length (mm),	5	4
breadth(mm),	3	4
100 dhal wt (gm)	3.38	4.62
Chemical Properties		
Moisture (%)	9.6	10.8
Ash (%)	4.15	5.5
Protein (%)	21.2	21.6
Starch (%)	50.6	49.5
Arabinose (%)	5.4	5.7
Fat (%)	0.93	1.93
Crude Fiber(%)	1.2	1.0
Calcium (mg/100g)	150	150
Phosphorous (mg/100g)	370	375
Battering quality		
Batter weight (g)	500	600
Batter volume (ml)	**750**	**900**
Oil absorption (ml)	130	135
Organoleptic character		
Color and acceptance	9	8
Flavour	9	7
Texture	9	9
Taste	8	7
Overall acceptability	9	8.5

(Source: Home Science College and Research Institute, Madurai)

Electronic Journal of Plant Breeding, 10 (3): 1250 - 1254(Sep 2019) DOI: 10.5958/0975-928X.2019.00159.5
ISSN 0975-928X

Field view - Performance of ADBG 13004 under rice fallow

Semi erect single plant with pods

Dull black colour with green tinge seed