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Research Article

A high yielding white seeded sesame variety : VRI 3

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Abstract
A high yielding white seeded sesame culture VS 07 023 was developed at Regional Research Station, Vridhachalam and released as VRI 3 during 2017. It is a cross derivative of SVPR 1 and TKG 87. The culture was evaluated during *rabi* and summer seasons. The culture VS 07 023 has registered an overall grain yield of 995 kg/ha which was 22.74 and 17.33 per cent yield increase over the check SVPR 1 (811kg/ha) and TMV (SV) 7 (848 kg/ha), respectively over 95 locations during *rabi* season. Similarly, the culture VS 07 023 has registered remarkably a higher mean seed yield of 1055 kg/ha against the check SVPR 1 (862 kg/ha) and TMV (SV) 7 (928kg/ha). The per cent increase in the mean seed yield over the check was 22.49 (SVPR 1) and 13.77 per cent (TMV (SV) 7). The culture is moderately resistant to *Macrophomina* root rot disease. The culture VS 07 023 is white seeded containing 50 per cent oil content and exhibited a profuse branching suitable for *rabi* and summer irrigated conditions. In view of stable performance of sesame culture VS 07 023, it was released as a new sesame variety VRI 3 during 2017 by Tamil Nadu Agricultural University, Coimbatore for cultivation in major sesame growing districts of Tamil Nadu during *rabi* and the summer irrigated conditions.

Key words
Sesame, white seeded, new variety,VRI 3

INTRODUCTION

Sesame (*Sesamum indicum* L.) belongs to the family Pedaliaceae and it is an annual herbaceous species cultivated for its edible seed and oil. It is one of the most important oldest oilseed crops widely cultivated in several countries of Asia and Africa especially in tropical and sub tropical regions. Sesame is considered as 'Queen of Oilseeds' due to its stabilized keeping quality contributed by high degree of resistance to oxidation and rancidity. Sesame oil is highly stable and rarely turns rancid in hot climates. It is rich in unsaturated fatty acids where the fatty acids composition is 14 per cent saturated, 39 per cent mono-unsaturated and 46 per cent poly-unsaturated fatty acids (Toma and Tabekhia, 1979). Sesame is rich in sulfur containing amino acids and limited in lysine and contains significant amounts of oxalic (2.5%) and phytic (5%) acids (Kapadia *et al*., 2002).

Generally sesame seeds have three main colours: Brown, Black and White. In India, the preference for seed coat colour in sesame varies from region to region. The physical appearance of seed colour is a key marketing factor for export and acceptability of sesame type varies greatly with cultural preference. White coloured sesame seeds are considered of higher quality and mostly preferred for making confectionary and bakery products in Middle East, U.S and European countries. Presently white seeded varieties generate a sizeable foreign exchange of Rs. 2000 corers annually to the country. Thus, white seeded varieties offers great scope for export potential, generating substantial income to the country. Furthermore, white seeded sesame is known to possess higher oil, protein and moisture ratios as compared to black seeded sesame (Kanu, 2011). Therefore, there is

a huge demand for high yielding white seeded sesame varieties with good oil quality suitable for export purpose. Nevertheless, only few commercial varieties such as Nirmala, Gujarat Til-2, JTS-8, HT-1, Tapi and Phule Til-1 which meet export quality are available in India under white seeded category. In Tamil Nadu, a white seeded sesame variety SVPR 1 was released long back in 1992. But the yield potential of this variety has become very low due to its susceptibility to pests and diseases. In general, average productivity of sesame continues to be low mainly due to its cultivation in sub marginal lands and non-availability of superior high yielding varieties lacking inbuilt resistance to biotic and abiotic stresses.

In India, sesame is cultivated in an area of 17.30 l. ha with the productivity of 431 kg/ha. India shares 12.4 per cent of world sesame production (Daisy Myint, *et al*., 2020). In Tamil Nadu, the area under sesame is 28,000 ha with the productivity of 384kg/ha (Season and Crop Report, 2015-16). With the objective to develop high yielding white seeded sesame variety, breeding work was initiated and a new high yielding white seeded sesame variety VRI 3 was developed to increase the production and productivity of sesame in Tamil Nadu as well as to create avenues for harnessing export potential of this important oilseed crop.

MATERIALS AND METHODS

Hybridization was attempted between SVPR 1 and TKG 87 at Regional Research Station, Vridhachalam during the year 2005. Both selected parents are white seeded type. The detailed breeding programme is depicted in the pedigree chart in **Fig. 1.**

Single plant selections for white seeded trait were exercised in the different segregating generations upto F_4. Plot wise evaluation was done for yield and yield

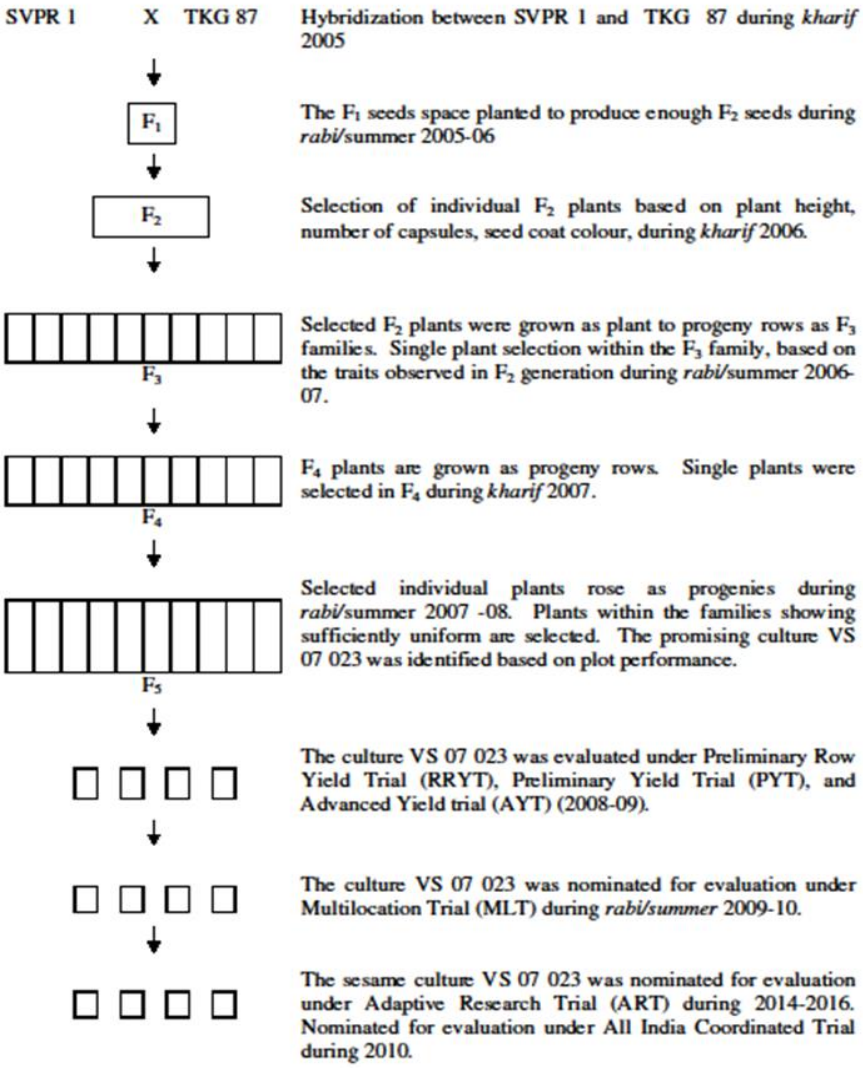

Fig 1. Pedigree chart of Sesame culture VS 07 023

attributing traits in F_5 under irrigated conditions during the year 2007-08. A homozygous culture, VS 07 023, isolated in this study was evaluated against SVPR 1 (White seeded) and TMV (SV) 7 (Brown seeded) in Station trails during the year 2007 - 2016 at Regional Research Station, Vridhachalam. Subsequently, the culture was tested in Multi Location Trials during 2009-10 in research stations of TNAU. Besides, the culture VS 07 023 was also evaluated in AICRP trials during 2009-10. On promotion, the performance of this culture was evaluated in Adaptive Research Trials conducted in KVKs of TNAU and State Department of Agriculture during 2014-16. Apart from this, On Farm Trials were also conducted in selecting locations across Tamil Nadu. Field screening of sesame culture VS 07 023 for *Macrophomina* root rot was also carried out as per the standard protocols.

RESULTS AND DISCUSSION

The overall performance of the sesame culture VS 07 023 evaluated during *rabi* and the summer seasons were presented in **Table 1a** and **Table 1b,** respectively. The culture VS 07 023 registered overall grain yield of 995kg/ha in *rabi* seasons which is 22.74 per cent and 17.33

Table 1a. Performance of VS 07 023 over different yield trials during *rabi* season

S. No.	Trials	Number of locations	Mean Seed Yield (kg/ha)			Per cent increase over SVPR 1	Per cent increase over TMV (SV) 7
			VS 07 023	SVPR 1	TMV (SV) 7		
1.	Station trials (Rabi 2007-16) RRS, Vridhachalam	9	1055	820	870	28.65	21.26
2.	Multilocation trials (Rabi 2009-10) TNAU Research Stations	6	949	775	-	22.45	-
3a.	ART conducted by KVK rabi 2014-15	20	974	812	850	19.95	12.86
3b.	ART conducted by Department of Agriculture rabi 2014-15	40	956	810	840	18.02	13.80
3c.	OFT conducted (2015-16)	15	1112	820	855	35.60	30.05
	Weighted Mean	**95**	**995**	**811**	**848**		
	Per cent increase over SVPR 1	**22.74**					
	Per cent increase over TMV (SV) 7	**17.33**					

Table 1b. Performance of VS 07 023 over different yield trials during the summer season

S. No.	Trials	Number of locations	Mean Seed Yield (kg/ha)			Per cent increase over SVPR 1	Per cent increase over TMV (SV) 7
			VS 07 023	SVPR 1	TMV (SV) 7		
1.	Station trials (Summer 2007-16) RRS, Vridhachalam	9	1131	926	974	22.13	16.11
2.	Multilocation trials (Summer 2009-10) TNAU Research Stations	7	992	816	-	21.56	-
3.	All India Co-ordinated Trials - IVT rabi Summer 2009-10	4	941	-	-	-	-
4	ART conducted by KVK Summer 2014-15	24	1040	853	884	21.92	17.64
4a	ART conducted by Department of Agriculture Summer 2014-15	48	1015	850	903	19.41	12.40
4b	ART conducted by KVK Summer 2015-16	20	1068	874	937	22.19	13.98
4c	ART conducted by Department of Agriculture Summer 2015-16	25	995	827	866	20.31	14.89
4d	OFT conducted (2015-16)	25	1210	910	1057	32.82	14.47
	Weighted Mean	**162**	**1055**	**862**	**928**		
	Per cent increase over SVPR 1	**22.49**					
	Per cent increase over TMV (SV) 7	**13.77**					

per cent yield increase over the check SVPR 1 (811 kg/ha) and TMV (SV) 7 (848 kg/ha), respectively. In the Station trials conducted during *rabi* season of 2007 -16, the culture recorded the highest grain yield of 1055 kg/ha over the check variety SVPR 1 which is 28.65 per cent and TMV (SV) 7 is 21.26 per cent yield increase. Multi location trails were conducted during 2009-10 *rabi* season and the culture VS 07 023 recorded a mean grain yield of 949 kg/ha with 22.45 per cent yield increase over SVPR 1. During the year 2014-15, it recorded the mean grain yield of 974 kg/ha in ART conducted at different KVKs was 19.95 per cent yield increase over the check SVPR 1. Similarly it recorded the highest grain yield of 956 kg/ha in ART conducted by the State Department of Agriculture. A total of 15 OFTs were conducted during 2015-16 of *rabi* season. It recorded the mean grain yield 1112 kg/ha which is 35.6 per cent (SVPR 1) yield increase over the check.

The overall results obtained from 162 locations conducted during the summer seasons revealed that the culture VS 07 023 registered remarkably a higher mean seed yield of 1055 kg/ha against the check SVPR 1 (862kg/ha) and TMV (SV) 7 (928 kg/ha). The per cent increase in the mean seed yield over the check was 22.49 per cent (SVPR 1) and 13.77 per cent (TMV (SV) 7). Station trials was conducted during the *summer* season of 2007-16, the culture VS 07 023 recorded a mean grain yield of 1131 kg/ha which was 22.13 per cent (SVPR 1) and 16.11 per cent (TMV (SV) 7) yield increase over the check. Similarly, the culture was evaluated at under MLT during 2009-10 summer season, it recorded the mean grain yield of 992 kg/ha over seven locations. It is 21.56 per cent yield increase over SVPR 1. The culture was also evaluated in AICRP on Sesame & Niger during *rabi*/summer 2009-10. The data from four locations revealed that the culture recorded a mean seed yield of 941 kg/ha. The sesame culture VS 07 023 recorded the highest mean seed yield of 1040 kg/ha in the ART by different KVKs and the seed yield increase over the check SVPR 1 was 21.92 per cent. It has also recorded the mean seed yield of 1015 kg/ha which is 19.41 per cent more than the check SVPR 1 in ART conducted by the State Department of Agriculture during 2014-15. During the year 2015-16 summer season, the culture was evaluated under ART for second year testing, and recorded the highest mean seed yield of 1068 kg/ha (KVKs) and 995 kg/ha which is 22.19and 20.31 per cent yield increase over the check SVPR 1. Sesame VS 07 023 was evaluated at 25 locations under OFT during 2015-16. The culture recorded 1210 kg/ha of mean seed yield which is 32.82and 14.47 per cent more yield when compared to the check SVPR 1 and TMV (SV) 7. The culture VS 07 023 exhibited its superior performance in almost all the locations evaluated against the check SVPR 1 and TMV (SV) 7 thus proving its wider adaptability.

Macrophomina phaseolina (Tassi) Goidanich causes root rot disease in sesame. Vyas in 1981 reported *M. phaseolina* as very serious and destructive pathogen in all sesame growing areas and causes 5-100 per cent yield loss. Considering the serious threat, the culture VS 07 023 was screened for *Macrophomina* root rot disease under sick plot. The culture was found to be moderately resistant to *Macrophomina* root rot disease (**Table 2**).

Analysis of various biochemical parameters revealed that the culture VS 07 023 had 50.1 per cent oil content which is on par with other released varieties of TNAU (**Table 3**). The identified sesame culture VS 07 023 has white seed coat, profuse branching type with glabrous, two carpelled, ended with acuminate tip capsules (**Table 4**).

Table 2. Reaction of sesame culture VS 07 023 to *Macrophomina* under field condition at RRS, Vridhachalam (Per cent)

S. No	Entries	*Rabi* 2013-14	Summer 2013-14	*Rabi* 2014-15	Summer 2015-15	Mean
1	VS 07 023	14	15	16	15	**15**
2	SVPR 1	18	20	22	20	**20**
3	TMV (SV) 7	24	22	20	22	**22**

Note: 1-10%: resistant; 11-20%: Moderately resistant; 21-30%: Moderately susceptible; 31-50%: Susceptible; 51-100%: Highly susceptible

Table 3. Quality traits of the sesame culture VS 07023

Characters	VS 07 023	SVPR 1
Oil content (%)	50.1	48.5
Carbohydrate (%)	17.56	16.23
Protein (%)	24.36	22.36
Fiber (%)	3.11	3.01
Ash (%)	3.67	3.47

Table 4. Morphological characters of sesame culture VS 07 023

Plant height	:	90-120 cm
Stem	:	Light green, Glabrous, Top branching habit with capsules sparsely arranged on the main stem.
Branch habit	:	Profuse branching
Leaves	:	Glabrous, mixed in phyllotaxy
Corolla	:	Purple white in colour, one flower per axil
Capsule	:	Glabrous capsules, two carpelled, ended with acuminate tip
Capsule length	:	1.5-2.5 cm
Capsule breadth	:	0.65-0.75 cm
Seed coat colour	:	Creamy White
1000 seed weight	:	2.8 g
Maturity range	:	80-85 days
Maturity group	:	Medium

Fig. 2. Field view of Sesame VS 07 023 as VRI 3

Considering the supremacy of the Sesame culture VS 07 023, it was recommended for release by 52nd Crop Scientists Meet on Oilseeds, 2016 by TNAU, Coimbatore and subsequently released as Sesame VRI 3 by 47th SVRC during 2017 which is suitable for cultivation during *rabi*/summer irrigated conditions in major sesame growing districts of Tamil Nadu (**Fig. 2**) and it has been notified vide Gazette Notification S.O. 1379 (E) dt. 27th March 2018.

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