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Research Article

Study the Fresh Seed Dormancy in Sesame (*Sesamum indicum* L.)

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ABSTRACT

The sesame seed of five varieties viz., GT 2, GT 3, TKG 22, Pragati and GT 10 were produced in kharif season and of three varieties viz., GT 2, GT 3 and GT 5 were produced in summer season at two locations of the Junagadh Agricultural University, Junagadh namely Agricultural Research Station, JAU, Amreli and Sagdiwidi Farm, JAU, Junagadh. The seed of five varieties produced at both the locations were brought immediately to the Department of Seed Science and Technology, College of Agriculture, JAU, Junaagdh and the observations were recorded on germination percentage immediately followed by 10 days interval along with the old seeds supplied by Agricultural Research Station, JAU, Amreli, of all these five varieties. From the results, it was concluded that freshly harvested seeds of white seeded sesame varieties GT-2, GT-3, TKG 22, Pragati and GT-5 produced in the previous season could not be utilized for sowing, as seed dormancy was found in these varieties and it was released after 115, 115, 95, 105 and 105 days after harvesting, respectively. However, black seeded variety GT 10 could be utilized for sowing in the next season, as it released the dormancy after at 35 days after harvesting (DAH).

Keywords: *Kharif, Germination, Genetics, Varieties*

INTRODUCTION

In sesame, germination problem observed when summer produce is utilized for *kharif* sowing; one of the reasons would be the existence of dormancy. Some reports are available on seed dormancy in sesame as reported by Ashri and Palevitch (1979) in Mexican cultivar Cola de Burrego and Tanesaka et al. (2012) in *S. mulayanum* and F_1 hybrid of *S. mulayanum* and *S. indicum*. No such studies of Indian sesame varieties in general and Gujarat varieties in particular have been carried out. Therefore, whether dormancy is present in Gujarat sesame varieties or not, a preliminary study was carried out by Department of Genetics and Plant Breeding, JAU, Junagadh. The study was carried out up to 30 days after harvesting and the results showed that dormancy in sesame seed is there.

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Based on this preliminary observation and the issue of summer sesame produce to use it for *kharif* sowing, the experiment is framed out to know the extent of fresh seed dormancy present in sesame both in *kharif* and summer seed production.

MATERIALS AND METHODS

The experiment material comprises of sesame seed of five varieties *viz*., GT 2, GT 3, TKG 22, Pragati and GT 10 were produced in *kharif* season (kharif 2016, 2017 & 2018) and of three varieties *viz*., GT 2, GT 3 and GT 5 were produced in summer season (summer 2017, 2018 & 2019) at two locations of the Junagadh Agricultural University, Junagadh namely Agricultural Research Station, JAU, Amreli and Sagdiwidi Farm, JAU, Junagadh to know the extent of fresh seed dormancy in sesame both in *kharif* and summer seed production. The seed of five varieties produced at both the locations were brought immediately to the Department of Seed Science and Technology, College of Agriculture, JAU, Junaagdh and the observations were recorded on germination percentage immediately (5 days after harvesting) followed by 10 days interval until the germination percentage reaches above 80 per cent, which is the Indian Minimum Seed Certification Standard for sesame. The old seeds supplied by Agricultural Research Station, JAU, Amreli, of all these five varieties were used as check. The statistical analysis carried out as per Factorial complete randomized block design.

RESULT AND DISCUSSION

The seed of five varieties *viz*., GT 2, GT 3, TKG 22, Pragati and GT 10 were produced at both the locations (Agricultural Research Station, JAU, Amreli and Sagdiwidi Farm, JAU, Junagadh) during *kharif* 2016, 2017 and 2018. However, the seed production at Sagdividi Farm, JAU, Junagadh was failed due to high rainfall at harvesting stage in *kharif* 2016, while the seeds of three varieties *viz*., GT 2, GT 3, and GT 5 were produced during summer 2017, 2018 and 2019 at both the above locations.

The results of Amreli location of *kharif* 2016 revealed the presence of seed dormancy in sesame (Table 1). The old seeds are germinated, but amongst the fresh seeds of the five varieties, GT 10 was reached to the optimum germination (above 80 %) after 25 DAH; TKG 22 and Pragati were reached to optimum germination after 105 DAH; while in remaining two variety. GT 2 was reached to optimum germination at 115 DAH and GT 3 was reached to optimum germination at 125 DAH.

The results of seed produced during *kharif* 2017 at both the locations (Table 1) revealed the presence of seed dormancy in sesame. The old seeds are germinated as per the seed standards right from first date of observation, while the fresh seeds showed seed dormancy. Of the five varieties, GT 10 was reached to the optimum germination (above 80 %) after 25 DAH in Amreli location and 35 DAH at Junagadh location. Variety TKG 22 was reached to optimum germination after 75 DAH and 105 DAH at Amreli and Junagadh, respectively. Pragati was reached to optimum germination at 115 DAH at Amreli location and 125 DAH at Junagadh location. GT 2 reached to optimum germination at 105 DAH at Amreli location and 125 DAH at Junagadh location, while GT 3 reached to optimum germination at 85 DAH at Amreli location and 125 DAH at Junagadh location.

The results of seed produced during *kharif* 2018 at both the locations (Table 1) revealed the presence of seed dormancy in sesame. Of the five varieties, GT 10 reached to the optimum germination (above 80 %) after 55 DAH in Amreli and 45 DAH at Junagadh location. TKG 22 reached to optimum germination after 85 DAH and 95 DAHat Amreli and Junagadh, respectively. Pragati reached to optimum germination at 95 DAH at both the locations. GT 3 reached to optimum germination at 105 DAH at both the locations, while GT 2 was reached to optimum germination at 115 DAH at both the locations.

The results of seed produced during summer 2017 at both the locations (Table 1) revealed the presence of seed dormancy in

sesame. The old seeds are germinated as per the seed standards right from first date of observation, while the fresh seeds showed seed dormancy. Of the three varieties, GT 5 was reached to the optimum germination (above 80 %) after 65 days of harvest at Amreli, while it reached to the optimum germination (above 80 %) after 125 days of harvest at Junagadh. Varieties GT 2 and GT 3 reached to the germination above 80 percent after 145 days of harvest at both the locations.

The results of seed produced during summer 2018 at both the locations (Table 1) revealed the presence of seed dormancy in sesame. Of the three varieties, GT 5 was reached to the optimum germination (above 80 %) after 75 DAH at Amreli location and 95 DAH at Junagadh location, while GT 3 reached to the germination above 80 per cent after 125 DAH at both the location, whereas GT 2 reached to the optimum germination after 125 DAH at Amreli location and 115 DAH at Junagadh location.

The results of seed produced during summer 2019 at both the locations (Table 1) revealed the presence of seed dormancy in sesame. Of the three varieties, GT 5 was reached to the optimum germination (above 80 %) after 85 DAH at Amreli and 95 DAH at Junagadh location, while GT 2 and GT 3 both reached to the germination above 80 percent after 115 DAH at Amreli and 105 DAH at Junagadh location.

From the above results, it can be concluded that seed dormancy is present in sesame. Among the different varieties tested, on an average, black seeded variety GT 10 released the dormancy (as per the IMSCS, > 80 %) at 35-40 DAH, while all the white seeded varieties tested released the dormancy after 100-115 DAH.

Table 1: Germination (%) of fresh harvested seeds of *kharif* season from ARS, Amreli and Sagdividi Farm, Junagadh

Variety / Period of observation	Germination (%)												
	5 DAH	15 DAH	25 DAH	35 DAH	45 DAH	55 DAH	65 DAH	75 DAH	85 DAH	95 DAH	105 DAH	115 DAH	125 DAH
Fresh seeds (*Kharif* 2016) produced at Amreli													
GT-2	0.33	1.33	2.67	2.67	2.67	3.00	4.67	14.33	17.67	18.67	66.67	**82.67**	92.67
GT-3	0.00	0.00	1.33	1.67	4.67	6.33	8.67	9.33	9.67	11.33	25.00	75.33	**85.67**
TKG-22	4.67	5.67	11.33	14.00	17.00	33.67	48.33	70.67	71.00	72.00	**80.45**	90.00	92.00
Pragati	0.67	1.00	6.00	6.33	11.67	16.33	30.67	58.67	60.67	62.33	**85.33**	85.67	87.33
GT-10	53.33	60.00	**88.33**	-	-	-	-	-	-	-	-	-	-
*First year data of variety GT-10 was taken up to 25 DAH when germination reached 88.33%, so analysis was not possible for this year													
Fresh seeds (*Kharif* 2017) produced at Amreli													
GT-2	7.00	12.00	13.33	17.00	22.67	25.00	25.67	27.67	68.33	78.00	**81.33**	90.67	92.33
GT-3	3.00	5.33	7.00	8.67	14.67	20.33	25.00	62.00	**84.33**	88.67	87.67	97.33	98.33
TKG-22	22.67	24.33	25.67	26.67	50.67	54.00	55.67	**83.33**	87.67	90.33	93.33	97.33	99.00
Pragati	10.00	14.00	16.33	17.00	32.00	33.00	37.00	52.33	62.67	64.67	77.67	**84.67**	99.00
GT-10	72.00	79.00	**84.33**	88.00	94.33	96.00	97.00	97.67	99.00	99.00	99.00	99.33	99.00

	Variety (A)	DAH (B)	A X B
SEM	0.39	0.63	1.42
C.D.	1.10	1.78	4.00
C.V.%	4.26		

Table 1: Contd....

Fresh seeds (*Kharif* 2018) produced at Amreli													
GT-2	8.67	17.67	22.00	28.00	37.67	46.00	57.67	66.00	68.67	73.67	74.67	**85.67**	95.67
GT-3	11.33	20.33	26.67	38.00	46.00	55.00	63.00	70.00	72.33	78.00	**83.33**	90.33	97.67
TKG-22	44.33	44.67	46.67	51.33	51.67	61.33	68.00	77.00	**86.33**	93.33	97.33	96.33	96.67
Pragati	50.00	46.33	50.00	53.67	55.33	65.33	71.00	74.67	76.33	**86.67**	95.67	96.33	94.67
GT-10	54.33	57.00	60.67	72.33	79.67	**83.33**	87.00	88.67	91.67	98.33	97.67	99.00	98.33
	Variety (A)		**DAH (B)**		**A X B**								
SEM	0.58		0.93		2.09								
C.D.	1.62		2.62		5.86								
C.V.%	5.44												
Fresh seeds (*Kharif* 2017) produced at Sagdividi (Junagadh)													
GT-2	4.00	5.33	6.67	17.67	19.00	21.33	22.33	24.33	49.00	54.33	68.67	77.33	**84.33**
GT-3	6.67	8.00	9.33	17.00	18.67	21.33	24.33	26.33	47.33	56.00	69.67	70.33	**86.33**
TKG-22	9.33	11.33	12.67	21.67	29.33	30.00	32.33	58.00	64.67	76.00	**80.33**	87.00	90.33
Pragati	3.33	6.00	9.67	17.67	19.00	32.00	33.67	43.33	60.00	66.00	72.67	79.00	**86.67**
GT-10	25.67	27.66	45.00	**93.67**	94.00	94.67	96.67	98.00	99.00	99.00	99.33	99.00	99.67
	Variety (A)		**DAH (B)**		**A X B**								
SEM	0.57		0.92		2.05								
C.D.	1.59		2.57		5.76								
C.V.%	7.43												

Table 1: Contd....

Fresh seeds (*Kharif* 2018) produced at Sagdividi (Junagadh)													
GT-2	7.33	15.67	21.00	35.67	38.33	39.00	49.67	60.00	68.00	75.00	77.67	**84.67**	93.33
GT-3	10.67	21.67	27.67	34.33	48.00	45.00	51.33	63.33	70.33	75.33	**84.67**	94.33	97.67
TKG-22	29.33	37.67	42.33	51.00	54.33	62.67	61.33	69.00	77.67	**86.33**	89.00	92.67	95.00
Pragati	37.67	43.33	52.67	56.67	57.67	57.00	66.67	70.33	77.00	**83.67**	96.00	93.67	96.33
GT-10	49.00	65.67	75.00	78.00	**82.67**	87.00	88.67	93.00	95.00	97.67	97.33	98.33	98.67
	Variety (A)		**DAH (B)**		**A X B**								
SEM	0.57		0.92		2.06								
C.D.	1.60		2.58		5.77								
C.V.%	5.49												
Mean germination percentage over the years and locations during Kharif season													
GT-2	5.47	10.40	13.13	20.20	24.07	26.87	32.00	38.47	54.33	59.93	73.80	**84.20**	91.67
GT-3	6.33	11.07	14.40	19.93	26.40	29.60	34.47	46.20	56.80	61.87	70.07	**85.53**	93.13
TKG-22	22.07	24.73	27.73	32.93	40.60	48.33	53.13	71.60	77.47	**83.60**	88.09	92.67	94.60
Pragati	20.33	22.13	26.93	30.27	35.13	40.73	47.80	59.87	67.33	72.67	**85.47**	87.87	92.80
GT-10	50.87	57.87	70.67	**83.00**	87.67	90.25	92.34	94.34	96.17	98.50	98.33	98.92	98.92

Table 2: Germination (%) of fresh harvested seeds of summer season from ARS, Amreli and Sagdividi (Junagadh)

Variety / Period of observation	Germination (%) Fresh seeds produced at ARS, Amreli and Saddividi (Junagadh)														
	5 DAH	15 DAH	25 DAH	35 DAH	45 DAH	55 DAH	65 DAH	75 DAH	85 DAH	95 DAH	105 DAH	115 DAH	125 DAH	135 DAH	145 DAH
Fresh seeds (*Summer* 2017) produced at ARS, Amreli															
GT-2	9.33	13.67	16.67	24.33	25.67	30.67	43.00	49.00	53.67	62.67	67.33	69.67	71.33	73.67	**84.33**
GT-3	17.67	24.67	31.33	38.00	41.00	46.00	52.00	55.67	55.33	65.00	67.33	71.33	74.67	77.33	**84.33**
GT-5	19.67	21.00	26.00	45.67	72.33	79.67	**80.33**	81.00	81.33	84.33	84.67	86.67	86.33	87.33	91.00
	Variety (A)		**DAH (B)**		**A X B**										
SEM	0.61		1.36		2.35										
C.D.	1.71		3.82		6.61										
C.V.%	7.26														
Fresh seeds (*Summer* 2018) produced at ARS, Amreli															
GT-2	27.33	32.00	41.33	46.00	48.67	56	64.67	66.00	68.00	70.67	77.33	79.67	**82.00**	88.00	
GT-3	17.67	20.00	31.33	38.67	43.33	50.67	54	62.33	66.67	75.00	79.00	**82.67**	87.67	91.33	
GT-5	25.00	31.33	33.33	41.33	51.33	62.00	76.00	**85.33**	85.33	87.33	90.00	89.00	99.00	98.00	
	Variety (A)		**DAH (B)**		**A X B**										
SEM	0.52		1.13		1.95										
C.D.	1.47		3.18		5.51										
C.V.%	5.48														

Table 2: Contd....

Fresh seeds (*Summer* 2019) produced at ARS, Amreli															
GT-2	28.33	32.67	38.00	41.00	48.00	53.33	62.33	65.67	68.00	71.33	77.00	**83.00**	83.33	89.33	
GT-3	16.33	21.00	28.33	34.67	39.33	49.00	51.33	60.00	66.67	75.00	79.00	**84.00**	87.33	95.00	
GT-5	24.33	30.00	34.33	39.00	46.33	56.00	64.33	77.67	**83.33**	90.00	91.67	92.33	97.33	98.00	
	Variety (A)		**DAH (B)**		**A X B**										
SEM	0.52		1.13		1.95										
C.D.	1.47		3.17		5.50										
C.V.%	5.57														
Fresh seeds (*Summer* 2017) produced at Sagdividi (Junagadh)															
GT-2	0.00	0.33	6.00	9.00	10.00	10.67	12.67	17.67	19.00	23.67	34.33	62.67	73.33	74.33	**85.67**
GT-3	0.00	0.67	1.00	1.67	6.00	6.00	10.33	12.33	14.00	34.33	40.67	57.33	65.00	76.33	**82.33**
GT-5	7.33	16.00	27.00	35.67	43.33	45.67	46.33	46.66	47.33	52.00	54.67	68.67	81.00	84.67	93.00
	Variety (A)		**DAH (B)**		**A X B**										
SEM	0.53		1.19		2.06										
C.D.	1.49		3.34		5.80										
C.V.%	10.07														
Fresh seeds (*Summer* 2018) produced at Sagdividi (Junagadh)															
GT-2	26.67	31.00	42.33	49.33	54.33	55.33	62.33	69.67	71.00	79.00	**83.33**	84.67	86.33	87.67	
GT-3	13.67	20.67	27.00	35.67	40.33	45.67	51.67	60.67	67.00	71.33	79.33	**83.67**	84.00	87.00	
GT-5	27.00	33.33	38.00	42.33	44.00	40.33	50.00	60.67	70.33	**81.00**	85.67	88.00	86.33	86.67	
	Variety (A)		**DAH (B)**		**A X B**										
SEM	0.57		1.24		2.15										
C.D.	1.61		3.49		6.05										
C.V.%	6.30														

Table 2: Contd....

Fresh seeds (*Summer* 2019) produced at Sagdividi (Junagadh)															
GT-2	30.00	31.00	39.00	42.67	50.67	54.67	66.33	73.00	74.67	77.67	**80.67**	87.33	86.33	91.67	
GT-3	17.00	20.00	25.33	35.33	40.00	44.67	50.33	58.00	71.67	78.67	**82.67**	86.33	87.00	96.33	
GT-5	28.00	32.67	37.00	41.33	44.33	47.00	51.00	60.00	73.67	**81.33**	84.67	84.67	86.33	98.00	
	Variety (A)		**DAH (B)**		**A X B**										
SEM	0.51		1.10		1.90										
C.D.	1.43		3.09		5.36										
C.V.%	5.49														
Mean germination percentage over the years and locations during summer season															
GT-2	20.28	23.45	30.56	35.39	39.56	43.45	51.89	56.84	59.06	64.17	70.00	77.84	**80.44**	84.11	85.00
GT-3	13.72	17.84	24.05	30.67	35.00	40.34	44.94	51.50	56.89	66.56	71.33	77.56	**80.95**	87.22	83.33
GT-5	21.89	27.39	32.61	40.89	50.28	55.11	61.33	68.56	73.55	79.33	**81.89**	84.89	89.39	92.11	92.00

CONCLUSION

The experiment concluded that freshly harvested seeds of white seeded sesame varieties GT-2, GT-3, TKG 22, Pragati and GT-5 produced in the previous season could not be utilized for sowing, as seed dormancy was found in these varieties and it was released after 115, 115, 95, 105 and 105 days after harvesting, respectively. However, black seeded variety GT 10 could be utilized for sowing in the next season, as it released the dormancy after at 35 days after harvesting (DAH).

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