

Original Research Article

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Evaluation of Cumin Genotypes Suitable for Timely and Late Sown Conditions

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ABSTRACT

Keywords

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Cumin (*Cuminum cyminum* L.) crop is highly infected by blight disease in late sown conditions, experiments were conducted to identify genotype suitable for late sown condition, two cumin genotypes JC-2000-28 and JC-95-102 found to be most prominent genotype for late sown conditions. It was found that there were increases in yield by 64.27 and 44.31 per cent, respectively and reduction in *Alternaria* blight incidence on different locations under study.

Introduction

India is the largest consumer of the spices as well as a predominant country in spices production in the world. Therefore, it is known as “The land of spices”. Among the seed spices, cumin (*Cuminum cyminum* L) popularly known as "Zeera", is one of the most important seed spices crop of India belongs to the family *Apiaceace*.

The cultivation of cumin is confined to the tropical and sub-tropical region of the world and India is one of the principal countries engaged in its cultivation.

It is also considered to be the native of Egypt, Turkey and East Mediterranean region. It is mainly cultivated in India, Pakistan, Iran, Turkey, China, Egypt and Israel *etc*.

In India, it is mainly cultivated in Gujarat, Rajasthan and in some parts of Madhya Pradesh as well as Uttar Pradesh. Gujarat ranks first in area and production of cumin.

Cumin is grown in area about 383 lakh hectares with the total production of cumin is 2.92 lakh tones having productivity of 763 Kg/ha in Gujarat (Anon., 2017).

Materials and Methods

Varietal evaluation and Effects of different dates of sowing on *Alternaria* blight of cumin

Crop improvement trials under late sown conditions started during the year 2011, Preliminary yield trials with 18 cumin entries were tested at Seed Spices Research Station, Jagudan. To test entries at different location Small Scale varietal Trials (SSVT) with 18 entries were carried for two subsequent years *i.e.* 2012 and 2013 at Jagudan and Halwad centre under late sown condition (30th November). Among them only 12 entries promoted to the Large Scale Varietal Trials (LSVT) at Jagudan, Halwad and Sanand from the year 2015 to 2017. All trials were laid down in Randomised Block Design with split

plot. Statistical analysis for the seed yield was carried out. Incidence of blight, wilt and powdery mildew were also measured on scaling based techniques. The comparison between normal date of sowing and late date of sowing compared only for yield data. Seeds of different genotype of cumin were maintained and developed by Seed Spices Research Station, SDAU, Jagudan were used for conducting different trials.

Per cent Disease Intensity (PDI)

The disease intensity was be assessed by selecting twenty plants randomly in each date of sowing and was be graded on 0 to 5 scales. The disease intensity was recorded on the basis of following description

Grade	Description
0	: No symptoms on plants. (Free from disease)
1	: Symptoms on leaf tip and leaves only
2	: Symptoms on leaves and petioles
3	: Symptoms on leaves, petioles and stem
4	: Symptoms on leaves, branches, stem and inflorescence
5	: Symptoms on leaves, stem, branches inflorescences including seeds

Percent disease intensity (PDI) at weekly interval from initiation of disease. Per cent disease intensit

y was be worked out by following formula (Datar and Mayee, 1981)

$$\text{PDI} = \frac{\text{Sum of all numerical ratings}}{\text{Total number of plants observed} \times \text{Maximum grade}} \times 100$$

Results and Discussion

Two genotypes of cumin *viz.*, JC-2000-28 and JC-95-102 were found promising under late sown conditions, the entry JC-2000-28 recoded average 785.30 kg/ha seed yield, which was 64.27 per cent higher than Gujarat Cumin-4. The entry JC-2000-28 recorded maximum seed yield of 1451 kg/ha at Halwad

location during the year 2014-15, which was 90.17 per cent higher than state average yield of cumin seeds. Moreover, JC-95-102 was also found second next promising and higher yielder genotype under late sown condition. JC-95-102 was exhibited 682.70 kg/ha sees yield, which was 44.31 per cent higher than that of GC-4 (542.10 kg/ha). With comparison of timely son condition, JC-2000-28 recorded

18.68 per cent higher yield, interestingly, the said genotype was found 59.61 per cent superior under late sown condition, than that of popular variety under timely sown condition (Table 1). In context to disease incidence, JC-2000-28 found least susceptible to *Alternaria* blight, on and average only 15.21 per cent disease intensity of *Alternaria* blight as found under late sown condition, which is reflected on seed yield of all variety. Interestingly, wilt incidence was found at par

with wilt resistance variety Gujarat Cumin-4. Besides that infection of powdery mildew also found at negligible level under late sown condition in the genotype JC-2000-28. Besides that test weight of JC-2000-28 was recorded 5.07 which 85.05 per cent higher than check variety GC-4. Test weight is directly contributing to the seed yield, under late sown condition improving in test weight is good sign as far as seed quality and yield is concern (Table 2).

Table.1 Seed yield and disease incidence comparison of promising genotypes of cumin under late sown and timely sown conditions

Trial	Year	Date of sowing	Location	Promising Entries			% increase over check		CD	CV
				JC-95-102	JC-2000-28	GC-4 (C)	JC-95-102	JC-2000-28		
PET	2010-11	L	Jagudan	683	687	706	-3.26	-2.69	173.4	15.5
		T		600	622	684	-	-		
PET	2011-12	L	Jagudan	540	819	1035	-47.83	-20.87	220	15.1
		T		510	681	934	-	-		
SSVT	2012-13	L	Jagudan	546	708	338	61.54	109.47	110	11.0
		T		512	670	421	-	-		
SSVT	2012-13	L	Halwad	1028	1033	397	160.20	158.94	321	21.2
		T		874	810	312	-	-		
SSVT	2013-14	L	Halwad	431	1058	392	9.95	169.90	218	18.1
		T		401	845	324	-	-		
LSVT	2014-15	L	Halwad	1385	1451	916	51.20	58.41	234	12.2
		T		1024	984	814	-	-		
LSVT	2014-15	L	Sanand	763	710	698	9.31	1.72	132	12.9
		T		684	690	587	-	-		
LSVT	2015-16	L	Jagudan	454	436	246	84.55	77.24	50.54	8.3
		T		410	400	210	-	-		
LSVT	2015-16	L	Sanad	401	333	204	96.57	63.24	145	22.3
		T		321	301	207	-	-		
LSVT	2016-17	L	Jagudan	591	623	489	20.86	27.40	129	13.0
		T		531	614	432	-	-		
			Late Sown	682.70	785.30	542.10	44.31	64.27		
			Timely Sown	586.70	661.70	492.50				

T-(Timely sowing) -15th November of each year, L-(Late Sowing) 30th November of each year
 Only late sown condition yield data considered

Table.2 Average Per cent Disease Intensity of *Alternaria* blight, Wilt and powdery Mildew and test weight of cumin seed under late sown condition from the year 2010-11 to 2016-17

Entries	<i>Alternaria</i> Blight	Wilt	Test Weight	Powdery Mildew
JC-2000-28	15.21	25.00	5.02	5.20
JC-95-102	41.00	100.00	4.21	25.00
GC-4	41.00	25.00	4.27	32.00

The escaping is important mechanism for disease reaction, the late sown conditions is favourable for suppressing spore and inoculums development, hence ultimately, disease reaction does not found prominent on the cumin plant. Moreover, in case of JC-2000-28, host plant interaction play crucial down reaction. Fungi *Alternaria brunsii* does not prefer JC-2000-28 as a host and it may be one reason that *Alternaria* blight, Powdery mildew was not successes to developed its primary and secondary inoculums. In context to *Fusarium* wilt disease, the results revealed that the genetic source and pedigree are same for JC-2000-28 and GC-4. These finding are found in the harmony with Deepak *et al.*, (2008).

In conclusion, cultures JC-2000-28 and JC-95-102 found to be most prominent genotype under late sown conditions, in respect to seed yield and found less suffered from important diseases cumin. As JC-2000-28 found wilt resistant culture under wilt sick plot, because

genesis of GC-4 and JC-2000-28 are same. Fungi *Alternaria brunsii* did not prefer JC-2000-28 as a host for development and expansion of spore. Hence it would not be wrong to say that JC-2000-28 is suitable for late sown condition for escaping blight and powdery mildew with resistance genes for *Fusarium* wilt.

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