

Characterization and evaluation of indigenous Ajwain (*Trachyspermum ammi*) germplasms under North Gujarat condition

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ABSTRACT

Ajwain (*Trachyspermum ammi* L.) is one of the important minor seed spice crops mainly cultivated an area of 35000 hectares in Gujarat, Rajasthan, M.P. Whereas A.P. and Karnataka grown to a limited extent. Indian Ajwain a native India has huge genetic variability for various traits. The germplasms consisting of 43 genotypes collected from different districts of Gujarat were studied based on eight quantitative and one qualitative trait during *rabi* 2008-09. Wide variability existed among the genotypes for all the morphological and economic traits.

Days to 50 per cent flowering (87-98), Days to Maturity (152-162), Plant height (70.7-95cm), Number of branches (7-13.3), Number of umbels (12-22), Number of umbellate (8.7-16.7), Number of seeds (14.7-22.3), 1000 seed weight (0.66-14.0 gm) and yield /net plot (444-1630Kg) were highly variable based on the range.

key word: Ajwain, Genetic variability, Gujarat, Indigenous germplasm.

INTRODUCTION

Ajwain (*Trachyspermum ammi* L.) is one of the important minor seed spice crop known as Bishop's weed, it belongs to the genus *Trachyspermum* of Apiaceae family. It is a diploid (2n=18) having a cross pollinating breeding behavior, grown under irrigated as well as conserved moistures condition in Gujarat. Ajwain is the native of India, has huge genetic variability for various traits. The major Ajwain producing countries are India, Egypt, Afghanistan, Pakistan and North Africa. In India, Gujarat, Rajasthan, M.P., A.P. and Karnataka are the leading states in respect of area and Production. The districts of Jamnagar (84.61, 80.21, 520), Mehsana (4.07, 5.57, 750), Bhavnagar (4.07, 5.57, 750), Amreli (2.36, 2.38, 550), Tapi (1.63, 1.63, 1000) and Ahmedabad (0.55, 1.0, 1000)

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are leading in Gujarat state where data in parenthesis indicates % contribution of total seed spices in area, production and productivity kg/ha compared to state respectively (Tikka *et al.*, 6), where it is cultivated in scattered pockets. The Ajwain is grown as rain fed in *kharif* in districts of Jamnagar and Tapi, while in Mehsana, Ahmedabad, Amreli and Bhavnagar grown as irrigated crop in *rabi* season. Ajwain somewhere is raised by farmers on bunds of the main crops, hence lacking the real statistics. The area, production and productivity of Ajwain seed in Gujarat during 2007-08 were 9.82 thousands hectares, 5.54 thousands tonnes and 550 kg/ha, respectively (DAO, 2). The share of Gujarat in area and production is 15.6 per cent and 29.2 per cent,

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respectively towards total area and production of country (2005-06). Seed of Ajwain are largely consumed within the country and a small quantity is exported to the western countries. On average India exports Ajwain worth of rupees 50 millions.

Ajwain seeds are used in small quantities for flavoring foods, as antioxidants, as preservatives, or in medicine or for manufacture of essential oils for use in perfumery, essence & in medicines. Oil is almost to brownish liquid unique odor and sharp burning taste. On standing, part of thymol may separate from the oil as crystals, sold as 'ajowian ka phul' or 'sat ajwain' and is much valued as medicine and has all the properties ascribed for its seeds. This is used in surgery as an antiseptic and also valued for treatments of hookworm.

Since last few years the status of the crop remains steady in area and production in India. Long duration and non-Synchronous Maturity behaviour are the main inhabiting factors for Ajwain expansion status. Obviously, having long duration crop, none synchronous maturity of crop.

Ajwain has huge genetic variability for all the morphological and economic traits. So attempts was made to evaluate the germplasms & characterization for all characters which is prerequisite for the utilization in the crop improvement programme.

MATERIALS AND METHOD

The preliminary characterization and evaluation of 43 genotypes (Released variety and local entries of Ajwain germplasm collections was carried out at the Centre for Research on Seed Spices, Sardarkrushinagar Dantiwada Agricultural University, (23.52' N, 72.40' E, 70 m MSL), Jagudan, Gujarat during 2008-09. The accessions originated from different corner of state mainly from Saurashtra, Ahmedabad, Tapi and Mehsana. These were tall, non-synchronous maturity, late, early, solid stem, high yielding and local land race types.

The accessions were grown in an Augmented Block design (ABD) with check varieties (Gujarat Ajwain -1) in each block with two rows of 4 meter length with row to row spacing of 90 cm and plant to plant spacing was 30 cm. All the recommended crop protection measures were followed timely to control insect pest for successful raising the crop. A uniform fertilizer dose of 20 kg N and 40 kg P₂O₅ ha⁻¹ was applied and normal agronomic

practices were followed. Observations were taken on five randomly selected plants from each of the replications for quantitative and qualitative characters as per minimal descriptor developed by NRCS, Malhotra and Vashishtha, (4). Mean data from each of the replications were used for analysis, statistically, the essential oil percentage was determined in percentage by steam distillation method by Clevenger apparatus method (A.O.A.C., 1)

RESULTS AND DISCUSSION

Wide range of variability was recorded in those characters. Similarly, Sethi (5) reported the germplasm of Ajwain had marked variability for yield and morpho-physiological characters. Majority of accessions showed brown colors and presence of strips on the fruit. However, variation was observed in height, no. of umbels, umbellate, seeds wt., 1000 seeds wt. and yield are highly variables.

The quantitative characters also showed wide variation in the evaluated Ajwain germplasm. The range of variability and frequency observed in qualitative traits are given in Table-1; those are determining grain quality and economic traits of the crops. The results of descriptive statistical analysis are presented in Table-2. The characters of days to 50 per cent flowering (87-98), days to maturity (152-162), plant height (70.7-95 cm), number of branches (7-13.3), number of umbels (12-22), number of umbellate (8.7-16.7), number of seeds (14.7-22.3), 1000 seed weight (0.66-1.14) and yield/net plot (370–1630 kg) were highly variable based on the range. Same study was made in Gujarat (Mehta *et al.*, 3) with considerable variability in indigenous germplasm and revealed mainly contributed characters are umbellate/umbel and umbels/plant towards seed yield.

CONCLUSION

Among the 48 genotype, were found better in respect to grain yield, grain quality and none shattering habit of grain. The plant type were early; none-synchronous in maturity, dwarf having solid stem. In ajwain five selections have been identified for earliness, high yield.

For strengthening genetic resources of ajwain the collections from the indigenous sources may not contribute much to strength the available genetic stock. Hence, it is suggested that systematic efforts should be initiated immediately to procure exotic materials from the centre of origin or from other area of world to enrich our germplasms for & important programme.

Table: 1 Characterization and primary evaluation of ajwain

Characters	Variation	No. of accessions
Fruit size	Bold	11
	Medium	10
	Small	22
Inflorescence colour	White	12
	Creamy	31
Leaf size	Narrow	18
	Medium	20
	Large	05
Fruit type	Shattering type	11
	None- Shattering type	32
Fruit shape	Ellipsoidal	16
	Ovate	27

Table: 2 Statistical analyses of quantitative characters

Sr. No.	Characters	Range	Min	Max	Mean
1	Days to 50% flowering	11	87	98	92.5
2	Days to Maturity (Early)	10	152	162	157
3	Plant height(cm) (Dwarf)	24.3	70.7	95	82.85
4	No. of branches plant ⁻¹	6.3	7.0	13.3	10.15
5	No. of umbels plant ⁻¹	98.0	12	22	17
6	No. of umbellates umbel ⁻¹	8	8.7	16.7	12.7
7	No. of seeds umbel ⁻¹	7.6	14.7	22.3	18.5
8	1000 seed weight (g)	0.48	0.66	1.14	0.9
9	Grain Yield (g plot ⁻¹)	1260	370	1630	1000
10	Volatile oil content (%)	2.7	4.1	6.8	5.45

Table: 3 Promising accessions of ajwain identified from evaluation

Sr. No	Character	GA-1 (Ch)	Details	No. of Entries	Prom
1	Days to 50% flowering	93	< 90 > 97	9 1	JA-111, JA-218, JA-selection-09 JA-224
2	Days to Maturity (Days; Early)	158	< 154 > 160	3 4	JA-111, JA-182, JA-
3	Plant height (cm; Tall)	89	< 80	7	JA-108, JA-215, JA-
5.	Paliwal, R.V. and Jain U.K., 2006. genetic divergence in Ajwain (<i>Trachyspermum ammi</i> L.)			7	JA-183, JA-227, GA-
4	No. of branches plant ⁻¹ (More branches)		> 10 < 8	4 2	JA-183, JA-105-107 JA-190, JA-
6.	Tikka, S.B.S., Y. Ravindrababu and Prajapati D.B. 2009. "Seed Spices Research in Gujarat: Present status, constraints and Future strategies" – Invited paper presented in National Seminar in "Recent Advances in Spices Crops". Held at CRSS, Jagudan, during 4-6 March.-2009			5	JA-183, JA-115, JA-175
6	No. of umbellate umbel ⁻¹ (More umbellate)		> 14 < 8	5 1	JA-106, JA-111
7	Centre for Research on Seed Spices, S.D.A.U, Jagudan, Dist: Mehsana, Gujarat P: 1			6	JA-148, JA-selection, N
8	100 accepted weight (g; Bold seeds)	1.0	< 17 > 1.0 > 0.7	3 9 3	JA-131, JA-111, JA-226, JA-185, JA-
9	Volatile oil content (%)	5.5	> 5.9 < 4.5	5 4	JA-118, JA-180, JA-

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