Indian J. Pl. Genet. Resources 6(1): 33-36, 1993

SURVEY AND PERFORMANCE OF *CYMBOPOGON* SPECIES OF INDIAN THAR DESERT

A. K. Shahi and B. L. Kaul

Regional Research Laboratory,
Jammu Tawi 180 001 (Jammu & Kashmir)

Cymbopogon species is widely distributed in the uncongenial arid environment of Indian Thar desert of Western Rajasthan. The available *Cymbopogon jwarancusa* (Jones) Schult from Bikaner site exhibited 1.26% essential oil content, corresponding to 55% piperitone as the major chemical constituent. *Cymbopogon jwarancusa* (Jones) Schult. sub species *olivieri* (Boiss.) Soenakro has been reported mainly from Osian and Luhawat villages of Jodhpur district but during the survey, this aromatic grass was found at Chandan village of Jaisalmer district also. It contained essential oil content of 0.4%, having 62% citral, 8.12% geraniol and 13% of geranyl acetate as the major chemical constituents. Estimation of some morphological characters alongwith the variation in essential oil contents and their major chemical constitutents have been discussed.

Key words : Cymbopogon, germplasm veriability, coefficient of variation, phytochemistry

Considerable research on pasture grasses has been carried out by several workers (Chakraborty, 1971; Ahuja & Mann, 1975) for improvement of rangelands in Indian desert. Apart from pasture grasses, India has vast resources in aromatic grasses, especially *Cymbopogon*, mostly wild, distributed all over the country. A number of *Cymbopogon* species are of great commercial importance as a source of essential oil for use primarily in perfume and pharmaceutical preparations. As part of research programme of survery of the natural resources of Indian Thar desert, collection of two *Cymbopogon* forms, viz., *C. jwarancusa* and *C. jwarancusa* subspecies *olivieri* was done. Shahi and Sen (1989 a, 1980 b) earlier reported the existence of *C. jwarancusa* grass in Indian Thar desert whereas Shahi (1992) reported the presence of *C. jwarancusa* sub sp. *olivieri.* from Jodhpur district. The latter was however, collected from Jaisalmer also.

MATERIALS AND METHODS

The availability of *C. jwarancusa* is mainly confined to Bikaner (Udasar and Devkundsagar), Deshnoke, Nokha, Sri Dungargarh, Churu and Sardarshahr. *C. jwarancusa* sub-species *olivieri* is collected from Osian and Luhawat villages of Jodhpur district (Shahi, 1992) but the same is also reported from

Chandan village of Jaisalmer district of western Rajasthan. The study was confined to selected sites on ecological perspective with a special emphasis on morphological characters in relation to essential oil content and its quality. In general, the above mentioned sites are hot and arid (xerothermic index 300) (Duggal, 1968; Shahi, 1990). The soil of each site is sandy in texture.

The morphometric characters, viz., plant height, effective tillers, plant circumference and weight were noted for the study of intra specific variations. The essential oils of *Cymbopogon* species were obtained by hydro-distillation method using a Clevenger apparatus. The oils dried over anhydrous sodium sulphate, were used for analysis. Identification and percentage of major chemical constituents was determined by GLC method.

RESULTS AND DISCUSSION

A wide variability was observed among the morphological characters of both the *Cymbopogon* forms, as signified by higher coefficients and variation (Table 1). This would help in isolation of superior strains from wild populations having higher percentage of essential oil content and major chemical constituent (s) in it. The variation in essential oil content of these *Cymbopogon* taxa was also quantified and depicted in Table 2. The maximum oil content was observed in *C. jwarancusa* (1.26%) collected from Bikaner (Devkundsagar) site, possibly due to appropriate vegetative phenophase. The other plants exhibited reproductive phase (anthesis) at the time of collection.

Table 1 : Means and coefficients of variation (cv) of various morphological characters of *Cymbopogon* species of Indian Thar desert

Characters	Site/Species			
	Bikaner		Jaisalmer	
	C. jwarancusa		*C. jwarancusa* subspecies *olivieri*	
	Mean	C.V.	Mean	C.V.
Plant height (cm)	110.00	21.12	89.90	23.50
Effective tillers/plant (No.)	85.00	30.32	68.00	26.95
Plant circumference (cm)	50.00	25.31	60.32	36.95
Fresh weight / plant (kg)	0.82	20.01	1.42	19.01

C. jwarancusa collected from Bikaner site, exhibited the presence of piperitone (45 to 54%) as the major chemical constituent in the oil. This confirms with the earlier observations of Shahi and Sen (1989 a; 1989 b). C.

jwarancusa subspecies *olivieri* exhibited the presence of citral (42-62%), geraniol (8-19%) and geranylacetate (10-13%) as the major chemical constituents (Table 2), which confirms the findings of Shahi (1992). The plants of the same species, collected from Chandan village of Jaisalmer district, exhibited similar pattern of chemical profile (Table 2). Thus, these species can become important basic material for breeding an alternative source of piperitone and citral.

Table 2 : Essential oil contents and major chemical constituents of *Cymbopogon* species of Indian Thar desert at different sites

Sites	Plant species	Parameter (s)					
		Pheno-phase	Essential oil content %, V/W, fr. wt. basis	Major chemical constituents (%)			
				Piperi-tone	Citral	Geraniol	Gera-nyl acetate
Bikaner							
(i) Udasar	*C. jwarancusa*	Flowering	0.73	45.06	-	-	-
(ii) Devkundsagar	*C. jwarancusa*	Vegetative	1.26	54.91	-	-	-
Jodhpur							
(i) Lohawat	*C. jwarancusa* (sub sp. *olivieri*)	Flowering	0.60	-	42.49	19.93	10.08
Jaisalmer							
(i) Chandan	*C. jwarancusa* (sub sp. *olivieri*)	Flowering	0.40	-	62.04	8.12	12.90

The initial phytochemical estimation of the quantity and quality of essential oils of *Cymbopogon* species of the Great Indian Thar desert is reported. These species may also be tested for yield potential. Further exploration and selection can be undertaken for high yielding, drought tolerant strains. Breeding work may also be initiated to have desirable varieties suitable to arid/xeric conditions.

ACKNOWLEDGEMENTS

Authors express their gratitude to Dr.R.S. Kapil, Director, RRL, Jammu for providing necessary facilities. Thanks are also due to Miss R.K. Jamwal, Scientist, RRL, Jammu for GC analysis of essential oils.

REFERENCES

Ahuja, L.D. and H.S. Mann. 1975. Rangeland development and management in Western Rajasthan. *Ann. Arid Zone* **14** : 29- 44.

Chakraborty, A.K. 1971. Pasture production and its use in arid and semi-arid areas of Rajasthan (India) and Kazakhastan (USSR). *Ann. Arid Zone* **10** : 37-42.

Duggal, S.L. 1968. Bioclimatic regions of Punjab, Haryana, Rajasthan, Himachal Pradesh and Union Territories of Chandigarh and Delhi. *In* : Proceedings of the Symposium on Recent Advances in Tropical Ecology, R. Misra & B. Gopal (eds). International Society of Tropical Ecology, Part I, p. 114-137.

Shahi, A.K. and D.N. Sen. 1989 a. Note on *Cymbopogon jwarancusa* (Jones) Schult. - Source of piperitone in Thar desert. *Curr. Agric.* **13** : 99-101.

Shahi, A.K. and D.N. Sen. 1989b. *Cymbopogon jwarancusa* (Jones) Schult. - A wild aromatic grass of Indian Thar desert as an additional source of piperitone. *Oikoassay* **6** : 73-75.

Shahi, A.K. 1990. Ecological studies on some desert grasses with special reference to *Cymbopogon jwarancusa* (Jones) Schult. Ph.D. Thesis, University of Jodhpur, Jodhpur.

Shahi, A.K. 1992. A search of *Cymbopogon jwarancusa* (Jones) Schult. subspecies *olivieri* (Boiss.) Soenakro. A citral yielding grass from Indian Thar desert. *Indian Perfumer* **36** : 182-184.