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ECO-CLIMATIC DIVERSITY OF WILD CUCURBITS IN BIJAPUR DISTRICT, NORTH KARNATAKA, INDIA

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ABSTRACT

Present paper deals with eco-climatic distribution of wild cucurbits in Bijapur district of Karnataka. It represents information about some soil properties, as well as morphological variations among some of the species along with traditional uses as socioeconomic aspect.

INTRODUCTION

Cucurbitaceae members are famous for medicinal and ethnic uses. The number of wild species is also notable. It is interesting to study these species for local uses. There are number of reports on floristics and distribution of cucurbits but the literature lacks reports based on eco-climatic conditions at micro-level. Therefore, in the present investigation, the wild cucurbits of Bijapur district of Karnataka were studied for eco-climatic diversity. It is the time for domestication of wild species (like cucurbits) for adaptability under adverse conditions. It is well known that most of the medicinal plants yield good quality drugs under natural conditions.

Many wild species of cucurbits show morphological variations. On the other hand the species having such a plasticity may survive, grow and reproduce under varied climatic conditions. Such type of eco-climatic based distribution of cucurbits has been studied for south Maharashtra (Chavan 2000).

MATERIALS AND METHODS

The Bijapur district lies under northern dry zone of Karnataka and comprises five talukas namely Bijapur, Basavan-Bagewadi, Indi, Muddebihal and Sindagi. The total geographical area of the district is 10,53,470 ha. Only 12.5% of the area is under irrigation (District Statistical Department 2004, Das 1981). Five sites from each taluka were selected after the survey (Fig. 1). The selection is based on the cucurbit vegetation, purely on uncultivated land.

The study was carried out from November 2004 to October 2005. The selected sites were screened thoroughly by visiting each locality bimonthly. Ecological data were collected by studying five sites in each taluka. Distribution of the species and variation within the species were studied by local survey with traditional uses as socioeconomic aspects. Soil samples were collected from the same sampling sites. Habitat analysis was carried out following the standard methods (APHA 1998) and Trivedy & Goel (1986).

RESULTS AND DISCUSSION

In Bijapur district major ten wild and semi-wild cucurbit species were recorded Taluka-wise (Table 1). Basavan-Bagewadi and Indi talukas show occurrence of maximum species. Less number of species were recorded from Bijapur, Sindgi and Muddebihal talukas. Basavan-Bagewadi and Indi receive higher rainfall than the other talukas under study.

Fig. 1: Map of the study area.

Curcurbit species like *Diplocyclos palmatus* (Fig. 7), *Momordica cymbalaria, Melothria maderaspatana, Cucumis trigonus* and *Coccinia grandis* (Fig. 3) are common species to entire Bijapur district. *Citrulus colocynthis, Kedrostis foetidissima* and *Lagenaria vulgaris* are comparatively less common species.

One of the significant observations of the present study is that though *Ptenolepsis gracinii* was recorded in flora of Madras Presidency (Gamble 1957) and flora of Karnataka (Saldana 1984), the present study sites lack the above species. It indicates uneven and eco-climatic based species specific distribution of wild cucurbits (Table 1).

Cucumis prophatarum, Kedrostis foetidissima and *Citrullus colocynthis* species are dominant to restricted areas and areas to specific region with respect to rainfall conditions (Fig. 2).

Major species of the district are described briefly with noticeable characters.

***Cucumis trigonus* Roxb.** (Fig. 4) is a potential cucurbit. The fruits are eaten by local people. Under unripened condition the fruits are slightly bitter to sour. If collected in unripened condition, its shelf life is more. It is interesting that farmers of the area commonly eat unripened fruits, as they grow during the entire dry spell. It may possibly provide antioxidants in the form of organic acids. Anabolic activity of the fruits is reported by Nail et al. (1981). Other significant observations were made with respect to morphological variations of the fruits and seeds. The results are depicted in Table 2.

The phenotype may be altered by developmental responses to environmental changes, i.e., the individual may exhibit phenotypic plasticity. Greater the level of plasticity, the more the spatial pattern of phenotypes within and among populations, which may be dependent on the environmental pattern and not on the organization of phenotypes (Levin 1988).

Cucumis prophatarum (Fig. 5) is commonly found in Bijapur and Sindagi talukas, where soil is comparatively red and more gravely (Table 3). A trailing, very scabrous plant with globose spiny fruit striped green and white. This species has not been reported from Bijapur district in the flora of

Table 1: Occurrence of some wild cucurbits in Bijapur district.

Sr. No.	Species	Bijapur	Indi	Sindagi	Muddebihal	Basavan-Bagewadi
1.	*Coccinia grandis* (L) Voigt	+	+	+	+	+
2.	*Corallocarpus epigaecus* (Rott) Clask	+	+	-	+	+
3.	*Cucumis trigonus* (Roxb)	+	+	+	+	+
4.	*Cucumis prophatarum* Linn.	+	-	+	-	-
5.	*Citrulus colocynthis* Schrad	+	+	+	-	-
6.	*Diplocyclos palmatus* Linn.	+	+	+	+	+
7.	*Kedrostis foetidissima* (Rottle)	-	-	-	+	+
8.	*Momordica cymbalaria* Naud.	-*	+	+	+	+
9.	*Melothria maderaspatana* (L) (Cogin)	+	+	+	+	+
10.	*Lagenaria vulgaris* Ser.	-	+	-	-	+

* Occurrence is comparatively rare in wild but luxuriant as a weed.

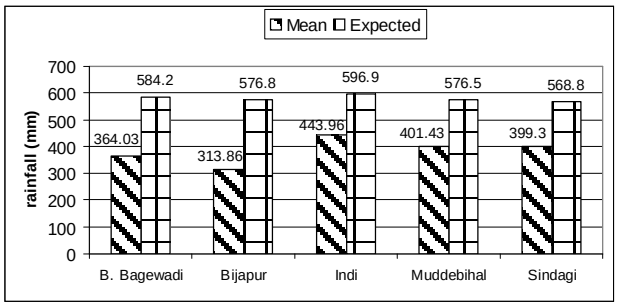

Fig. 2: Recorded annual mean rainfall taluka wise from 2002 to 2004.

Karnataka by Sharma & Singh (1984) and Saldana (1984). Though its habitat reported in black cotton soil, it is interesting to find its occurrence in more gravely soil.

***Citrulus colocynthis* Schrad** (Fig. 6) is traditionally known medicinal plant of the Bijapur district and commonly known as 'Kadu-kawadi" (Uppin 1974) in vernacular. The species is unique from ecological point of view among all the cucurbits. It is not associated with other cucurbit and weedy species. It grows only with scrubby grasses, i.e., where weeds also cannot grow. It appears as a mat and full of fruits. Next to *Cucumis trigonus*, it can tolerate drought during summer up to March (Alathwadi & Grace 1986). It is famous medicine of the district. Traditionally, it is used for snake bite, toothache, joint pains, jaundice and problems related to menstrual cycle (Patel & Patel 2004). It is commonly used for its antibacterial property for humans as well as cattle (Bhandari 1990).

It has not been reported in Bijapur district in flora of Karnataka analysis by Sharma & Singh (1984) and flora of Karnataka (Saldana 1984). It is the first report of occurrence of this species in Bijapur district.

Kedrostis foetidissima (Fig. 8) has not been specifically mentioned in Bijapur (Sharma & Singh 1984, Saldana 1984). But it is one of the significant members found in the Muddebihal and Basavan Bagewadi region of Bijapur.

***Momordica cymbalaria* Naud** (Fig. 9) is one of the most common cucurbits in the entire Bijapur district except red gravely soils. It is the weedy species and favors black cotton soil. Its vernacular name in this region is Kartikai (Uppin 1974) and it is most important livelihood of traditionals. Interestingly, collection and sale of fruits of this species is observed only in Bijapur district and never found in other adjacent regions of Karnataka.

It is traditional abortifacient and diabetic remedy of the region and previously its tubers were known for cloth washing. Therefore, it can be mentioned here that it is an eco-sociologically important cucurbit member of this region. The distribution of *Momordica cymbalaria* to this particular region is specific and based on eco-climatic conditions.

Table 2: Population dynamics of *Cucumis trigonus* Roxb.

Sr. No.	Fruit circumference (cm)	Fruit diameter (cm)	Fruit length (cm)	No. of strips on fruit	Colour range	Seed breadth (cm)	Seed length (cm)	No. of seeds/ fruit
1.	12.604 ± 3.436	3.953 ± 1.098	7.1954 ± 2.219	*10 light green and 10 dark green *Total brown without strips	*Light green to dark green *Dark brown *Yellow	0.295 ± 0.055	0.550 ± 0.114	332.014 ± 90.370

*Sample size : 20

Fig. 3 : *Coccinia grandis*

Fig. 4 : *Cucumis trigonus*

Fig. 5 : *Cucumis prophatarum*

Fig. 6 : *Citrulus colocynthis*

Table 3: Variation in soil texture of five talukas in Bijapur district.

Sr. No.	Taluka	Soil from	Gravel (%)	Coarse sand (%)	Fine sand (%)	Silt & Clay (%)
1.	Basavan-Bagewadi	Un-cultivated	28.600	65.200	04.373	01.511
		Cultivated	20.100	77.300	01.712	00.570
2.	Bijapur	Un-cultivated	47.120	43.540	07.011	02.305
		Cultivated	19.300	59.600	11.275	04.274
3.	Indi	Un-cultivated	14.100	81.700	02.538	01.380
		Cultivated	05.700	70.500	17.281	05.927
4.	Muddebihal	Un-cultivated	25.200	71.300	02.501	00.654
		Cultivated	16.050	74.050	08.180	01.684
5.	Sindagi	Un-cultivated	27.200	70.400	01.875	00.442
		Cultivated	12.200	85.200	02.014	00.500

Though *Momordica dioica* has been included in Bijapur by Sharma & Singh (1984), it was not found in the study area. This species was not reported in the district even in the flora of Karnataka by Saldana (1984).

***Corallocarpus epigaeus* (Rott) Clark** (Fig. 10) is another tuberous species of cucurbit growing in the entire district. It is traditionally used in snake bite and wath (wath is Sanskrit word meaning unhealthy sign). It shows unique habitat. Its association is interesting and noticeable. It is associated with members of *Kedrostis foetidissima* (Fig. 8) on spiny supporting plant. *Corallocarpus epigaeus* is valued as alternative tonic and used for syphilitic and venereal complaints (Chakravarthy 1982).

Fig. 7 : *Diplocyclos palmatis*

Fig. 8 : *Kedrostis foetidissima*

Fig. 9 : *Momordica cymbalaria.*

Fig. 10 : *Corallocarpus epigaecus*

Table 4: Taluka-wise potential area for the growth of wild cucurbits in Bijapur district.

Sr. No.	Taluka	Uncultivated potential land			Total (ha) (1+2+3)	Un-cultivated land (ha)	Cultivated area	
		Potential land for cultivation (1)	Not suitable for cultivation (2)	Area under sparse tree (3)			Area sown	Area affected (ha)
1.	Basavan- Bagewadi	155	1268	-	1423	42459	136211	58790
2.	Bijapur	3627	4145	316	8088	88547	132416	42280
3.	Indi	534	1637	22	2493	99162	110839	47637
4.	Muddebihal	623	1016	450	2089	23356	96384	39765
5.	Sindagi	263	1509	518	2290	44319	90717	30287

Source : Bijapur District at a Glance. Joint Director of Agriculture, Bijapur (2004).

Table 3 indicates soil properties of five localities of Bijapur district. In the present investigation stress is given to wild cucurbits growing on uncultivated or barren land. It is evident that throughout the study area uncultivated soil is gravely than crop fields. There is no significant difference in soil pH from the cultivated and uncultivated soils. Throughout the region, pH is alkaline. Electrical conductivity of soil throws light on total soluble salts present in it. Cultivated soil of Bijapur, Basavan-Bagewadi and Sindagi talukas shows high electrical conductivity and organic matter is comparatively high in cultivated land. It may possibly due to addition of manures/fertilizers. But overall soil conditions are not fully suitable for plant growth. Alkaline pH is indicative of it (Williams 1987).

Basically, Bijapur district is drier region of Karnataka. According to Joint Director of Agriculture Bijapur, uncultivated area in the district is high. In addition to that area affected due to dry spell is also considerably more. Overall, 87.5% area is a dry land. The present observation on uncultivated area, in general, may be useful for both uncultivated as well as area affected due to dry spell (Table 4).

Mean annual rainfall of Bijapur district (taluka wise) from 2002 to 2004 is depicted in Fig. 2. During the study period, the annual rainfall was comparatively less than the normal or expected. Still the wild cucurbits are flourishing. Thus, all the cucurbit species are demanding detailed report on their ecoclimatic performance.

CONCLUSION

Entire Bijapur district is dominated by many potential cucurbits. Based on the survey and screening it can be suggested that some potential species are restricted to very specific ecoclimatic zones of this region thus, demanding more detailed studies at microlevel. Further work on this line is under progress.

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REFERENCES

Althawadi, A. M. and Grace, J. 1986. Water use by desert Cucurbits. *Citrulus colocynthis.* Oecologia (Berl.), 70: 475.

APHA 1998. Standard Methods for the Examination of Water and Wastewater 20th Edition, American Public Health Association, Washington DC.

Bhandari, M. M. 1990. Flora of the Indian Desert. MPS Reprot, 39, BGKT, Extension, New Delhi Road, Jodhpur-342 001.

Bijapur District at a Glance 2004. Joint Director of Agriculture, Bijapur.

Chakravarthy, H.L. 1959. Monograph on Indian Cucurbitaceae. Rec., Botanical Survey of India, 17: 111-234.

Chakravarthy, H.L. 1982. Fascicle Flora of India. Botanical Survey of India, Howrah.

Chavan, N. S. 2000. *Ex-situ* Conservation of Wild Cucurbits, UGC Project Report, Submitted to Shivaji University, Kolhapur.

Cook, T. 1903. The Flora of the Presidency of Bombay, Vol. I, pp. 562-563. Botanical Survey of India (BSI), Calcutta.

Das, B.K. 1981. Bijapur District. District Census Hand Book, Kartnataka, District Statistical Department, Bijapur, Zilla Panchayat.

Gamble, J.S. 1967. The Flora of the Presidency of Madras, Vol. I, Botanical Survey of India (BSI), Calcutta, India.

Levin, D.A. 1988. Plasticity, Canalizatin and evolutionary status in plants. In: Plant Population Ecology, Davy, A. J., Hutchings, M. S. and Wakkinson, A. R. (eds.), 28th Symposium of the British Ecological Society.

Naik, V. K., Agshikar, V. N. and Abraham, G. J. S. 1980. Analgesic and anti-inflammatory activity on alcoholic extracts of *Cucumis trigonus*. Roxbia, Preliminary communication. Pharmacology, 70: 52-56.

Nail, V. R., Agshikar, N. Y. and Abraham G. J. S. 1981. *Cucumis trigonus* Roxb. II, Diuretic activity. Ethnopharmac, 3: 15-19.

Patel, N. K. and Patel, K. B. 2004. Study of abortifacient plants used by adivasis of Ambaji area in Denta taluk in Gujarat. Ad. Plant Sci., 17(1): 37-40.

Saldanha, C. J. 1984. Flora of Karnataka (Ed. Mohan Primlani), Oxford & IBH Publishing Co., New Delhi.

Saldana, C. J. and Nicolson, D. H. 1976. Flora of Hassan district, Karnataka, India. 650-654. American Publications, New Delhi.

Sharma, B.D. and Singh, N.P. 1984. Flora of Karnataka Analysis, Botanical Survey of India.

Trivedy, R.K. and Goel, P.K. 1986. Chemical and Biological Methods for Water Pollution Studies. Environmental Publication, Karad, India.

Uppin, S.F. 1974. Karnalakada Sasyasampada, Karnataka University, Dharwad.

Williams, G. 1987. Technique and Field Work in Ecology. Bell and Hyman Ltd., Lond., 156 p.