

Diversity and horticultural grouping in *Capsicum* spp.

K P SUNIL¹ & RASHEED AHMAD²

Department of Applied Botany

Mangalore University

Mangalagangothri - 574 199, Karnataka, India.

Abstract

One hundred and sixty chilli (*Capsicum*) accessions maintained at Chalode (Kerala, India) were assigned to five species. The 128 *C. annuum* lines identified were assigned to 3 varietal groups and 12 horticultural groups. The characteristics and importance of the taxonomic groups identified are discussed in respect to selection, and intervarietal and interspecific hybridisation in chilli.

Key words : *Capsicum*, chilli, diversity.

The range of variability for economic attributes are limited in chillies (*Capsicum annuum* L.) and hence related and wild species of *Capsicum* need to be explored for their variability. Mabberley (1987) included 10 species under the genus *Capsicum*. Wang & Ma (1987) assigned chillies to eight species namely, *C. annuum* L., *C. frutescens* L., *C. chinense* Jacq., *C. chacoense* Hunz., *C. pubescens* R. & P., *C. praetermissum* Mcl., *C. baccatum* L. and *C. eximium* Mcl. The present study was undertaken to classify the 160 lines of chillies, collected through survey and correspondence, and maintained at TxD Pollination Unit, Chalode (Kerala, India). They were evaluated based on IBPGR (1983) descriptor and classified based on growth habit, flower and fruit characters.

Among the 160 lines studied, 128 lines fall under *C. annuum*, 12 under *C. frutescens*, 13 under *C. chinense*, 6 under *C. baccatum* and 1 under *C. chacoense* (Table 1). *C. chinense* and *C. frutescens* are notable for biennial or perennial habit and for the highly pungent and deep red-coloured fruits (Vål & Pitrat 1978). *C. chinense* is also valued for multiple disease resistance. *C. baccatum* is valued for resistance to cucumber mosaic virus and potato virus Y (IBPGR 1983). *C. chacoense* is characterised by vigorous habit, large leaves and male sterility. *C. annuum* is distinguished for its medium pungency and short duration.

Five varieties are recognised under *C. annuum* (Kuntze 1891) namely, *C. annuum* var. *cerasiforme* Irish., *C.*

¹ TxD Pollination Unit, Chalode, Kannur, Kerala

² Corresponding author

Table 1. Botanical identity and horticultural classification of chilli accessions maintained at TxD Pollination Unit, Chalode (Kerala, India)

Sl. No.	Accession No.	Source	Botanical name	Horticultural group
01.	CA 33 (Manjari)	COH, Vellanikkara	<i>C. annuum</i> var. <i>fasciculatum</i>	Jalapeno
02.	CA 53 (Pant C-1)	GBPUAT, Pantnagar	<i>C. annuum</i> var. <i>longum</i>	Small hot
03.	CA 60 (Jwala)	IARI, New Delhi	<i>C. annuum</i> var. <i>longum</i>	Anaheim
04.	CA 87 (G-4)	COH, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
05.	CA 89 (White Kanthari)	Mannuthy	<i>C. frutescens</i>	
06.	CA 94 (K-2)	Kovilpatti, Tamil Nadu	<i>C. annuum</i> var. <i>longum</i>	Anaheim
07.	CA 160	Cochin	<i>C. annuum</i> var. <i>fasciculatum</i>	Cherry
08.	CA 164	Quilon	<i>C. annuum</i> var. <i>longum</i>	Anaheim
09.	CA 165	Quilon	<i>C. annuum</i> var. <i>longum</i>	Anaheim
10.	CA 166	Quilon	<i>C. chinense</i>	
11.	CA 169	Quilon	<i>C. frutescens</i>	
12.	CA 171	Quilon	<i>C. chinense</i>	
13.	CA 175	Quilon	<i>C. chinense</i>	
14.	CA 179	Quilon	<i>C. chinense</i>	
15.	CA 180	Quilon	<i>C. chinense</i>	
16.	CA 181	Quilon	<i>C. chinense</i>	
17.	CA 182	Quilon	<i>C. chinense</i>	
18.	CA 189	Malappuram	<i>C. annuum</i> var. <i>longum</i>	Jalapeno
19.	CA 192	Jabalpur	<i>C. annuum</i> var. <i>longum</i>	Jalapeno
20.	CA 201	Cochin	<i>C. annuum</i> var. <i>longum</i>	Anaheim
21.	CA 205	Trichur	<i>C. chinense</i>	
22.	CA 206	Trichur	<i>C. annuum</i> var. <i>longum</i>	Jalapeno
23.	CA 207	Trichur	<i>C. annuum</i> var. <i>longum</i>	Anaheim
24.	CA 209	NBPGR,Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Small hot
25.	CA 211	NBPGR,Vellanikkara	<i>C. chinense</i>	
26.	CA 212	NBPGR,Vellanikkara	<i>C. chinense</i>	
27.	CA 213	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim

Sl. No.	Accession No.	Source	Botanical name	Horticultural group
28.	CA 219	COH, Vellanikkara	<i>C. annuum</i> var. <i>fasciculatum</i>	Jalapeno
29.	CA 221	NBPGR, Vellanikkara	<i>C. frutescens</i>	
30.	CA 222	Trichur	<i>C. frutescens</i>	
31.	CA 223	Cochin	<i>C. annuum</i> var. <i>longum</i>	Anaheim
32.	CA 225	Cochin	<i>C. annuum</i> var. <i>longum</i>	Anaheim
33.	CA 282	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
34.	CA 302	Beltsville, USA	<i>C. baccatum</i>	
35.	CA 307	Beltsville, USA	<i>C. chinense</i>	
36.	CA 308	Beltsville, USA	<i>C. frutescens</i>	
37.	CA 317	Beltsville, USA	<i>C. chinense</i>	
38.	CA 337	PAU, Ludhiana	<i>C. annuum</i> var. <i>longum</i>	Anaheim
39.	CA 345	Trichur	<i>C. annuum</i> var. <i>longum</i>	Small hot
40.	CA 352	COH, Vellanikkara	<i>C. annuum</i> var. <i>fasciculatum</i>	Short wax
41.	CA 354	Tirunelveli	<i>C. frutescens</i>	
42.	CA 355	COH, Vellanikkara	<i>C. frutescens</i>	
43.	CA 356	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
44.	CA 361	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
45.	CA 367	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
46.	CA 379	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
47.	CA 388	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
48.	CA 389	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
49.	CA 393	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
50.	CA 394	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
51.	CA 395	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
52.	CA 396	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
53.	CA 399	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
54.	CA 407	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
55.	CA 408	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
56.	CA 409	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
57.	CA 416	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
58.	CA 417	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>grossum</i>	Cheese
59.	CA 418	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim

Sl. No.	Accession No.	Source	Botanical name	Horticultural group
60.	CA 419	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
61.	CA 420	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
62.	CA 421	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
63.	CA 423	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
64.	CA 424	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
65.	CA 425	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
66.	CA 431	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
67.	CA 437	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
68.	CA 438	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
69.	CA 439	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
70.	CA 440	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Jalapeno
71.	CA 441	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
72.	CA 442	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
73.	CA 444	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
74.	CA 445	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
75.	CA 446	NBPGR, Vellanikkara	<i>C. frutescens</i>	
76.	CA 447	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
77.	CA 448	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
78.	CA 449	NBPGR, Vellanikkara	<i>C. frutescens</i>	
79.	CA 451 (Jwalamukhi)	COA, Vellayani	<i>C. annuum</i> var. <i>longum</i>	Cayenne
80.	CA 452 (Jwalasakhi)	COA, Vellayani	<i>C. annuum</i> var. <i>longum</i>	Cayenne
81.	CA 455	Rajeswari Nursery, Trichur	<i>C. annuum</i> var. <i>longum</i>	Cheese
82.	CA 456	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Anaheim
83.	CA 457	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Anaheim
84.	CA 458	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Cherry
85.	CA 459	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Pimento
86.	CA 460	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Ancho
87.	CA 461	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Ancho
88.	CA 462	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Ancho
89.	CA 463	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Ancho
90.	CA 464	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Ancho
91.	CA 465	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Cherry
92.	CA 467	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Anaheim
93.	CA 468	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Anaheim

Sl. No.	Accession No.	Source	Botanical name	Horticultural group
94.	CA 469	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Anaheim
95.	CA 470	IIHR, Bangalore	<i>C. chacoense</i>	
96.	CA 471	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Ancho
97.	CA 473	Shalimar Nursery, Trivandrum	<i>C. annuum</i> var. <i>longum</i>	Pimento
98.	CA 474	Shalimar Nursery, Trivandrum	<i>C. annuum</i> var. <i>longum</i>	Pimento
99.	CA 475	Cochin Flower Show	<i>C. annuum</i> var. <i>longum</i>	Long wax
100.	CA 476	Cochin Flower Show	<i>C. annuum</i> var. <i>longum</i>	Cherry
101.	CA 477	Shalimar Nursery, Trivandrum	<i>C. annuum</i> var. <i>longum</i>	Pimento
102.	CA 479-1	Cochin Flower Show	<i>C. annuum</i> var. <i>longum</i>	Pimento
103.	CA 479-2	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Ancho
104.	CA 480	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
105.	CA 481	Cochin Flower Show	<i>C. annuum</i> var. <i>longum</i>	Conical wax
106.	CA 482-1	COH, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Bell
107.	CA 482-2	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Bell
108.	CA 483	Shalimar Nursery,	<i>C. annuum</i> var. <i>longum</i>	Pimento
109.	CA 484	NBPGR, Vellanikkara	<i>C. chinense</i>	
110.	CA 485	IIHR, Bangalore	<i>C. annuum</i> var. <i>longum</i>	Cheese
111.	CA 486-1	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Cherry
112.	CA 486-2	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Jalapeno
113.	CA 486-3	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Cheese
114.	CA 486-4	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Cheese
115.	CA 486-5	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>grossum</i>	Cheese
116.	CA 487	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Ancho
117.	CA 488	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
118.	CA 489	Trichur	<i>C. annuum</i> var. <i>longum</i>	Cheese
119.	CA 490	COH, Vellanikkara	<i>C. frutescens</i>	
120.	CA 491	Alwaye	<i>C. annuum</i> var. <i>longum</i>	Pimento
121.	CA 492	Alwaye	<i>C. frutescens</i>	
122.	CA 493	Alwaye	<i>C. annuum</i> var. <i>longum</i>	Pimento
123.	CA 494	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
124.	CA 495	NBPGR, Vellanikkara	<i>C. baccatum</i>	
125.	CA 496	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Pimento
126.	CA 497	Trichur	<i>C. annuum</i> var. <i>longum</i>	Pimento
127.	CA 498	COH, Vellanikkara	<i>C. baccatum</i>	
128.	CA 499	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Ancho

Sl. No.	Accession No.	Source	Botanical name	Horticultural group
129.	CA 500	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Anaheim
130.	CA 501	NBPGR, Vellanikkara	<i>C. frutescens</i>	
131.	CA 502	COH, Vellanikkara	<i>C. baccatum</i>	
132.	CA 503-1	COH, Vellanikkara	<i>C. baccatum</i>	
133.	CA 503-2	NBPGR, Vellanikkara	<i>C. baccatum</i>	
134.	CA 504	Parassala	<i>C. annuum</i> var. <i>grossum</i>	Cheese
135.	CA 505	COH, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Bell
136.	CA 506	NBPGR, Vellanikkara	<i>C. annuum</i> var. <i>longum</i>	Ancho
137.	CA 508	Palghat	<i>C. annuum</i> var. <i>longum</i>	Pimento
138.	CA 509	Palghat	<i>C. annuum</i> var. <i>longum</i>	Anaheim
139.	CA 510	Palghat	<i>C. annuum</i> var. <i>longum</i>	Anaheim
140.	CA 511	Palghat	<i>C. annuum</i> var. <i>longum</i>	Pimento
141.	CA 516	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
142.	CA 517	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
143.	CA 544	IARI, Katrain	<i>C. annuum</i> var. <i>grossum</i>	Bell
144.	CA 568	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
145.	CA 575	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Pimento
146.	CA 575	Turkey	<i>C. annuum</i> var. <i>grossum</i>	Bell
147.	CA 578	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
148.	CA 579	IARI, Katrain	<i>C. annuum</i> var. <i>grossum</i>	Bell
149.	CA 582	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
150.	CA 586	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Small hot
151.	CA 589	Sikkim	<i>C. annuum</i> var. <i>grossum</i>	Bell
152.	CA 590	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
153.	CA 591	Dharwad (Byadagi)	<i>C. annuum</i> var. <i>grossum</i>	Bell
154.	CA 591-1	COH, Vellanikkara	<i>C. annuum</i> var. <i>grossum</i>	Bell
155.	CA 603 (Papri King)	Beltsville, USA	<i>C. annuum</i> var. <i>grossum</i>	Anaheim
156.	CA 605 (Papri Mild)	Beltsville, USA	<i>C. annuum</i> var. <i>grossum</i>	Anaheim
157.	CA 609	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Bell
158.	CA 610	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Anaheim
159.	CA 611	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Anaheim
160.	CA 612	IIHR, Bangalore	<i>C. annuum</i> var. <i>grossum</i>	Anaheim

annuum var. *conoides* Irish., *C. annum* var. *grossum* Sendt., *C. annum* var. *fasciculatum* Fingh. and *C. annum* var. *longum* Sendt. Among the 128 lines of *C. annum* in the present study, 101 fall under var. *longum*, 23 under var. *grossum* and 4 under var. *fasciculatum* (Table 1). Bell pepper (*C. annum* var. *grossum*) is suited only for September-October transplanting in Kerala due to its specific low temperature requirement for fruit set. Since bell peppers are consumed in much larger quantity (as salad or stuffed), it has potential for nutritional enrichment. The solitary bearing habit of bell peppers, however, is a limiting factor with respect to productivity and cost of production. In the closely related *C. annum* var. *fasciculatum* with multiple disease resistance, including wilt resistance of importance to Kerala, and wide adaptability, the fruits are in clusters. However, being very pungent, its intake is very low which is a limiting factor. *C. annum* var. *longum* is the long and mild form of chilli variety.

Greenleaf (1986) and Smith *et al.* (1987) who proposed a horticultural classification of *C. annum*, recognised 14 groups namely, bell, pimento, ancho, anaheim, cuban, jalapeno, serrano, small hot, cherry, short wax, cayenne, conical wax, long wax and cheese. Among the materials studied in the present investigation, 54 lines fall under anaheim group, 18 under pimento group, 16 under bell group, 10 under ancho group, 8 under cheese group, 7 under jalapeno group, 5 under cherry group, 4 under small hot group, 2 under cayenne group, 2 under conical wax group and 1 each under long wax and short wax groups. Serrano and cuban groups are not represented (Table 1).

The identified species/lines/horticultural groups would be valuable in crop improvement and selection programmes of *Capsicum* spp.

Acknowledgement

The authors are grateful to Mr. B V Shetty, Emeritus Scientist, Department of Applied Botany, Mangalore University for critically evaluating the manuscript.

References

- Greenleaf W H 1986 Pepper breeding In: Bassett M J (Ed.) Breeding of Vegetable Crops (pp. 69-127). A VI Publishing Company Inc., Westport, Connecticut.
- International Board for Plant Genetic Resources (IBPGR) 1983 Genetic Resources of *Capsicum*. International Board for Plant Genetic Resources, Secretariat, Rome.
- Kuntze O 1891 Revisio Generum Plantarum 1 & 2 : 447-450.
- Mabberley D J 1987 The Plant Book. Cambridge University Press, Cambridge.
- Smith P G, Villalon B & Villa L P 1987 Horticultural classification of peppers grown in the United States. Hort. Sci. 22 : 11-13.
- Vaul X A De & Pitrat M 1978 Interspecific crossing between *Capsicum annum* and *Capsicum baccatum*. Station d'Amelioration des Plantes maraicheres Centre de Recherches d'Avingon. INRA, France. In: Pl. Breed. Abstr. 48 : 8898.
- Wang M & Ma D H 1987 Study of analytical electrophoresis on *Capsicum* germplasm. Capsicum Newsl. 6 : 25.