

ON THE CONFUSION IN THE IDENTITY OF *ERAGROSTIS ATROVIRENS* *E. GANGETICA* AND *E. NUTANS*

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ABSTRACT

There is a lot of confusion in the identity of *Eragrostis atrovirens* (Desf.) Trin. ex Steud., *E. gangetica* (Roxb.) Steud. and *E. nutans* (Retz.) Nees ex Wight & Arn. resulting in many wrongly identified sheets in various herbaria and also confusing descriptions in literature. Based on detailed study this problem has now been resolved. Table given shows actual differences among the three species. Key for identification and authentic descriptions and images of spikelets and caryopses have also been provided.

Keywords: Poaceae, *Eragrostis*, identity problems.

INTRODUCTION

Eragrostis Wolf, the largest grass genus of the subfamily Chloridoideae with about 423 species is distributed in the tropical, subtropical and warm temperate regions of the world (Clayton and Renvoize, 1986; Ingram and Doyle, 2007; Ingram, 2010; Giraldo-Canas & al., 2012). The genus is characterized by having leaves with ciliate ligules, inflorescence a panicle, rarely racemes or spikes, occasionally reduced to a simple spike, florets many (very rarely with one floret), spikelets laterally compressed, glumes 1-nerved, lemmas usually 3-nerved and unawned, palea longitudinally bowed-out with glabrous to ciliate keels, lemma and palea disarticulating separately between florets but at times also having other modes of disarticulation (Peterson & al., 1997; Giraldo-Canas & al., 2012).

SYSTEMATIC TREATMENT

Since *Eragrostis* is a genus with much taxonomic complexity, confusions regarding the identity and circumscription of a number of species and infraspecific taxa are plenty in this group. Such confusion is very much evident in a group of species namely *E. atrovirens* (Desf.) Trin. ex Steud., *E. gangetica* (Roxb.) Steud. and *E. nutans* (Retz.) Nees ex Wight & Arn., that comes very close to each other. During detailed studies on this genus in India it was found that *E. atrovirens* and *E. nutans* in many herbaria are wrongly named as *E. gangetica* and *E. nutans* as *E. gangetica* or vice versa. Apart from the marked differences in the floral details, these three species externally look somewhat similar to each other in the herbarium leading to wrong conclusions in their determination.

One form of *E. atrovirens* appears in the field as a much tufted and completely glaucous plant with highly spreading panicle branches. Another form which can be confused with *E. gangetica* both in the field as well as in the herbarium is neither glaucous nor much branched where the size of the spikelets is also comparatively smaller and is grey in colour. *E. gangetica* is also apparently similar to *E. nutans* in having linear and narrow spikelets, persistent paleas (though subpersistent in *E. gangetica* and falls off after a period of maturity). Failure to observe these morphological variations at the species level can easily mislead one to wrong determination. The fact that 21 *Eragrostis* species newly described from different parts of the world are now considered synonymous to *E. gangetica* is because of this aspect (the plantlist.org 2010). *E. atrovirens* is similar to *E. nutans* by having closely packed florets on rachilla and 3 anthers. But the rare presence of 2 anthered condition in *E. nutans* can confuse it with *E. gangetica*, a species that always has 2 anthers. Some of the earlier workers have given a lot of importance to the annual or perennial habit for segregating the species. *E. gangetica* is an annual whereas *E. nutans* and *E. atrovirens* are perennials. However, it indeed brings a lot of ambiguity in the determination of species, as annual or perennial nature is difficult to be judged from herbarium sheets.

	<i>E. atrovirens</i>	<i>E. gangetica</i>	<i>E. nutans</i>
Panicle	Open, lax	Open, effuse	Narrow, somewhat congested
Spikelets	Broad, 4–10 mm long, 1.5–2.5 mm wide, dull green or grey with or without purplish tinge	Narrow, 3–5 mm long, 0.8–1.1 mm wide, dull green to grey with purplish tinge	Narrow, 4.5–9 mm long 1–1.2 mm wide, dull green to grey without purplish tinge
Florets	Closely arranged on rachilla	Loosely arranged on rachilla	Closely arranged on rachilla
Rachilla	Not visible between florets	Visible between florets	Not visible between florets
Lemma	Up to 1.8 mm long	Up to 1 mm long	Up to 1.3 mm long
Palea	Deciduous	Partly persistent	Persistent
Anthers	3	2	3 or 2
Caryopsis	Ellipsoid to oblong, up to 0.7 mm long, and 0.4 mm wide g, and 0.4 mm wide	Ellipsoid to ovoid, up to 0.4 mm long and 0.2 mm wide 0.4 mm long and 0.2 mm wide	Globose, up to 0.3 mm long and 0.2 mm wide long and 0.2 mm wide

All the above said and similar other problems have brought in considerable confusion about the correct identification of these species. The presence of many wrongly identified sheets of these species in different herbaria, suggests the urgent need for solving this problem.

Consequently all these three species were subjected to critical studies with live collections, dried specimens from different herbaria, literature and type images which finally proved that the caryopses of these species could be taken as the primary character to differentiate one from another, along with other important diagnostic characters like the size and shape of spikelets and lemma, arrangement of florets on rachilla, nature of palea and number of stamens in each floret. Lazarides (1997) says, “The caryopsis of *Eragrostis* is among the most useful organs for identification purposes”. A comparative chart prepared based on the above observations (table 1) and images of spikelets and caryopses (fig. 1) are given. Because of the confusion in identification, the descriptions given in some of the publications are unreliable. Authentic descriptions prepared during the present study are also included in this paper.

Key to species:

- 1a. Panicle linear, narrow, somewhat congested; palea persistent; caryopsis globose *E. nutans*
- 1b. Panicle open, spreading or effuse; palea deciduous or subpersistent; caryopsis ovoid to oblong or ellipsoid (2)
- 2a. Spikelets broad; florets closely arranged on rachilla; palea deciduous; caryopsis ellipsoid, oblong, up to 7 mm long, with prominent longitudinal ridge like reticulations on the surface *E. atrovirens*
- 2b. Spikelets narrow; florets loosely arranged on rachilla; palea subpersistent; caryopsis ovoid to ellipsoid, up to 4 mm long, more or less smooth on surface *E. gangetica*

1. *Eragrostis atrovirens* (Desf.) Trin. ex Steud., Nomencl. ed. 2. 1: 562. 1840; Bor, Grass. Burma Ceylon India Pakistan: 503. 1960; Babu, Herb. Fl. Dehra Dun: 610. 1977; C. J. Saldanha & Nicolson, Fl. Hassan Dist.: 729. 1978; B. M. Sharma & P. Kachroo, Fl. Jammu Pl. Neighbour. 1: 357. 1981; Britto & K. M. Matthew in K. M. Matthew, Fl. Tamil Nadu Carnatic pt. 2. 3: 1854. 1983; G. P. Roy, Grass. Madhya Pradesh: 85. 1984; B. D. Sharma & al., Fl. Karnataka Anal.: 329. 1984; B. M. Wadhwa & al. in H. J. Chowdhery & B.M. Wadhwa, Fl. Himachal Pradesh 3: 824. 1984; Vasudeva Rao, J. Econ. Taxon. Bot. 8 (1): 159. 1986; M. Sharma & al., Fl. Sem. Punjab 101. 1987; N. P. Singh, Fl. E. Karnataka 2: 685. 1988; Karth. & al., Fl. Ind. Enum. Monocot.: 215. 1989; Sreek. & V. J. Nair, Fl. Kerala- Grass.: 377. 1991; G. P. Roy & al., Fl. Madhya Pradesh: 524. 1992; D. C. Pal & B. Roy, J. Econ. Taxon. Bot. 16 (2): 286. 1992; R. P. Pandey in B. V. Shetty & V. Singh, Fl. Rajasthan 3: 1044. 1993; B. D. Sharma & al., Fl. Maharashtra St. Monocot.: 481. 1996; U. Shukla, Grass. N. E. India: 255. 1996; P. Singh in Hajra & D. M. Verma, Fl. Sikkim 1: 289. 1996; S. Moulik, Grass. Bamb. India 2: 597. 1997; T. Pullaiah, Fl.

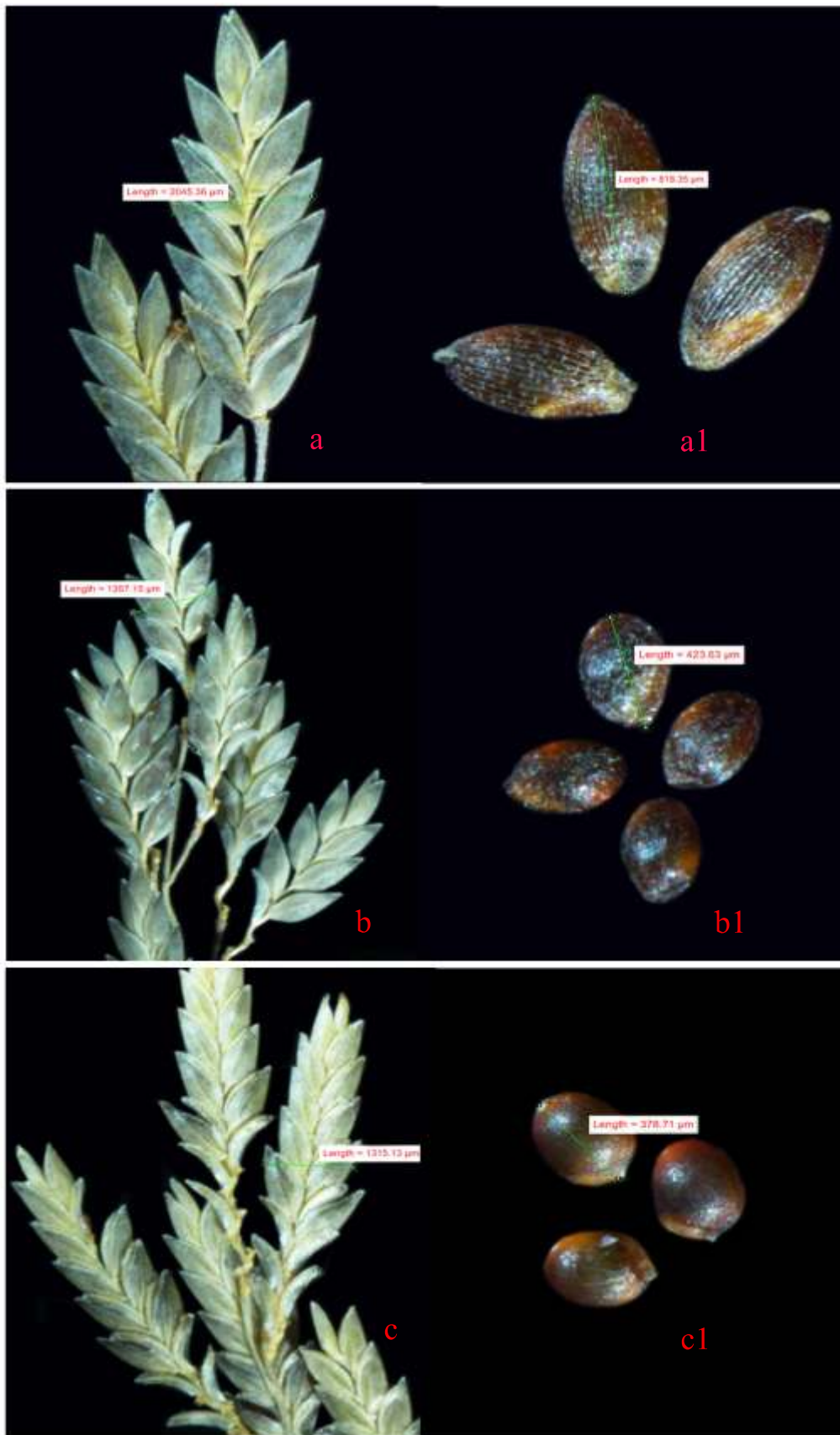


Fig. 1. : Spikelets and caryopses of: **a & a₁** *Eragrostis atrovirens* (Desf.) Trin. ex Steud.; **b & b₁** *E. gangetica* (Roxb.) Steud.; **c & c₁** *E. nutans* (Retz.) Nees ex Wight & Arn.

Andhra Pradesh 3: 1192. 1997; K. T. Mathew in K. M. Matthew, Fl. Pulney Hills: 1492. 1999. *Poa atrovirens* Desf., Fl. Atlant. 1: 73. t. 14. 1798. TYPE: Algeria: E Barbaria, *Desfontaines* 160 (holo.- FI; iso.- LE, P).

Culms tufted, geniculate, at times glaucous, 40 - 135cm high; nodes brownish; internodes 3 - 20cm long, eglandular. Leaves linear to lanceolate, 8 - 22 × 0.3 - 0.4cm, apex acuminate, base more or less rounded or subcordate, margins eglandular, upper surface scabrid; leaf sheaths 4 - 7cm long, glabrous, mouth bearded; ligule membranous with fine ciliate rim, 0.2 - 0.5mm long. Panicle ovate to effuse, 8 - 25 × 2 - 8cm, branches alternate, up to 10cm long, starts to divide away from main rachis, angled, scabrous along angles, base and axils glabrous; peduncle 15 - 35cm long, eglandular. Spikelets ovate to lanceolate, 4 - 10 × 1.5 - 2.5mm, dull green or grey with or without purplish tinge; pedicels 0.5 - 5mm long, eglandular, angled, scabrous along angles. Glume deciduous, linear to lanceolate, apex acute, margins entire, chartaceous, 1-nerved, keeled, slightly scabrid along keel towards apex; lower glume 1.5 - 1.8 × 0.3 - 0.4mm; upper glume 1.9 - 2.1 × 0.4 - 0.5mm. Florets 6 - 20, breaking from below upwards, closely arranged on rachilla with overlapping margins; rachilla slightly zigzag. Lemmas deciduous, ovate to lanceolate, 1.8 - 2.2 × 0.8 - 1mm, apex acute to subacuminate, margins entire, chartaceous, 3-nerved, lateral nerves straight, 1-keeled, keel thick and prominent, scabrid along keel towards apex. Paleas deciduous, elliptic to lanceolate, 1.8 - 2 × 0.3 - 0.4mm, apex acute, margins entire, 2-nerved, 2-keeled, scabrid along keels. Lodicules 2, c. 0.15mm long, apex truncate, white. Stamens 3; anthers 0.6 - 0.8mm long; filaments c. 0.6mm long. Ovary c. 0.2mm long; styles c. 0.3mm long; stigmas c. 0.7mm long. Caryopses ellipsoid to oblong, 0.6 - 0.7 × 0.3 - 0.4mm, brownish.

Fl. & Fr.: Almost throughout the year.

Distribution : Native to Africa; introduced in Argentina, Bolivia, Caribbean, Central America, Chile, Colombia, Japan, Marianas, Mascarene Islands, Malaysia (from Spain through India), Mexico, Myanmar, Peru, Sri Lanka, Taiwan, U.S.A, Venezuela etc. INDIA: Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Habit & habitat : Perennial. Growing along drains in sandy soils, along the banks of backwaters, rivers, streams, canals, in wetlands, hilly areas, as a weed in waste places and plantations, mostly in highly moist soils.

Chromosome nos.: 2n=20 (Kammacher & al., 1973), 2n=40 (de Wet, 1960), 2n=60 (Larsen, 1963; Christopher & Abraham, 1974; Gould & Soderstrom, 1974; Dujardin, 1978).

Uses : A fodder grass, but with poor nutritive value and yield, culms find use in thatching.

Specimens examined: ANDHRA PRADESH, Ananthapur Dist.: Reddy Palli Farm, 340m, 15.08.1981, N. Yesoda 281 (MH); Chittoor Dist.: Horslykonda, 05.05.1918, coll.? 15476 (MH); Kadapa Dist.: 19.07.1762, J.L. Ellis 14271 (CAL); Balapalle, 320m, 19.07.1962, J.L. Ellis 14271 (MH); Karim Nagar Dist.: Kodimial, 400m, 18.07.1964, G.V. Subbarao 20132 (MH); Kurnool Dist.: Diguva Metta, 07.08.1972, J.L. Ellis 42180 (MH); Visakhapatnam Dist.: Ananthagiri, 1125m, 18.10.1964, G.V. Subbarao 21759 (MH); Warangal Dist.: Pakhal, 290m, 25.02.1963, A.N. Henry 15911 (MH); BIHAR, Champaran Dist.: 07.04.63, K. Thoathathri 9937 (CAL); HIMACHAL PRADESH, Kangra Dist.: No Date, *Stoliczka*, s.n., (acc. no. 541884) (CAL); KARNATAKA, Hassan Dist.: Byra, 11.11.1978, Cecil J. Saldanha & P. Prakash 3793 (CAL); Mandhya Dist.: Sivasamudra, 28.10.1978, S.R. Ramesh & S.B. Manohar 3966 (CAL); South Kanara Dist.: Pilikode near, 10.11.1917, Coll.? 15337; 15331 (MH); KERALA, Idukki Dist.: Edapalayam, 850m, 25.09.1972, B.D. Sharma 41677 (MH); Kannur Dist.: Aralam, 250m, 26.02.1979, V.S. Ramachandran 61935 (CAL & MH); Kasaragode Dist.: Peelikooda, 06.02.2007, K.K. Suresh 3155 (MBGS); Kozhikode Dist.: Nilanjara - Chedaleth, 900m, 14.08.1964, J.L. Ellis 19992 (MH); Palghat Dist.: Chindakk Forest, 12.01.1980, N.C. Nair 65419 (MH); Pulikal Forest, 20.07.1964, K.M. Sebastine 20839 (MH); Thiruvananthapuram Dist.: Neyyar, 175m, 26.05.1979, M. Mohanan 63288 (CAL & MH); Thrissur Dist.: Chalakkudi river side - Kodasseri, 300m, 22.03.1980, K. Ramamurthy 66287 (CAL & MH); Wayanad Dist.: Karappuzha Dam site, 19.02.2008, K.K. Suresh 4871; MADHYA PRADESH, Bastar Dist.: Keskal, 567m, 17.11.1958, K. Subramanyam 7121 (CAL & MH); Damoh

Dist.: Sirghampur, 17.09.79, *B.K. Shukla* 29981 (CAL); Jubbulpur Dist.: 13.03.1962, *K.M. Sebastine* 13959 (CAL); Mandha Dist.: Kanta, 08.03.62, *J.K. Maheshwari* 4710 (CAL); Rewa Dist.: 13.02.1959, *K.M. Sebastine* 7736 (CAL); Saugor Dist.: 03.10.1960, *N.P. Balakrishnan* 11417 (CAL); MAHARASHTRA, Bombay State: Koka Falling, 02.12.57, *P.C. Nanda* 1324 (CAL); North Kanara Dist.: 26.11.89, *W.A. Talbot* 2067 (CAL); MEGHALAYA, Dist.? Chema Hateam, 06.10.1867, *C.B. Clarke* 5619 (CAL); ODISHA, Angul Dist.: 14.12.1902, *J.H. Lace* 2589 (CAL); Ganjam Dist.: Mahendragiri, $\pm 1158\text{m}$, 17.08.1931, *V. Narayanaswami* 5743 (MH); RAJASTHAN, Ganganagar Dist.: 17.11.1976, *G.P. Roy* 3958 (CAL); TAMIL NADU, Chengalpatu Dist.: Kambakam Hills, 06.05.1913, *coll.*? 8954 (MH); Coimbatore Dist.: Akkamalai, 1625m, 18.02.1980, *M. Chandrabose* 65853 (MH); Kanyakumari Dist.: Muthukuzhi Estate - Near, 1400m, 27.07.1977, *A.N. Henry* 49408 (MH); Madurai Dist.: Combai, 333m, 16.09.1961, *K.M. Sebastine* 12926 (MH); Nilgiri Dist.: Aug. 1883, *J.S. Gamble* 12339 (CAL); Coonoor, June 1883, *J.S. Gamble* 12131 (CAL); Ebanad Stream Bank, 900m, 29.08.1970, *G.V. Subbarao* 36411 (MH); Salem Dist.: Hogainakal, 13.02.1915, *coll.*? 11619 (MH); 11.02.1927, *K.C. Jacob* 17994 (MH); Tirunelvely Dist.: Ambasamudram, 13.05.1901, *C.A. Barber* 2745 (MH); Trichirapalli Dist.: Puliyancholai river bank, 233m, 29.10.1958, *K.M. Sebastine* 7042 (MH); TRIPURA, West Tripura, Agartala-Tipperah, 20.12.14, *P.M. Debberman* 334 (CAL); UTTAR PRADESH, Aligarh Dist.: 11.11.87, *J.F. Duthie* 6779 (CAL); Gonda Dist.: Balpur, 01.06.86, *K.K. Khanna & R. Saran* 37335 (CAL); Satna Dist.: Majhgawan, 23.02.1987, *R. Prasad* 38456 (CAL); WEST BENGAL, Bardwan Dist.: Eden Canal, 16.10.1894, *J.D. Hooker* 1206 (CAL); Birbhum Dist.: Moshmara Forest, 18.12.1969, *R.K. Basak* 1263 (CAL); Hughly Dist.: Goghat, 11.03.1902, *J.D. Hooker* 35 (CAL); Purulia Dist.: No Date, *K.C. Malik* 1039; 22.02.75, *J.K. Sikdar* 56 (CAL).

2. *Eragrostis gangetica* (Roxb.) Steud., Syn. Pl. Glumac. 1: 266. 1854; Prain, Bengal Pl. 2: 1222. 1908 (repr. ed. 2: 921. 1963); Haines, Bot. Bihar Orissa pt. 5 & 6: 958. 1925 (repr. ed. 3: 1004. 1961); C. E. C. Fisch. in Gamble, Fl. Madras: 1826. 1934 (repr. ed. 3: 1264. 1957); Bor, Fl. Assam 5: 101. 1940; T. Cooke, Fl. Bombay 3: 547. 1958 (repr. ed.); Bor, Grass. Burma Ceylon India Pakistan: 508. 1960; R. R. Stewart, Bull. Bot. Surv. India 9: 124. 1967; S. K. Jain, J. Bombay Nat. Hist. Soc. 72 (3): 769. 1975; Babu, Herb. Fl. Dehra Dun: 611. 1977; M. M. Bhandari, Fl. Ind. Des.: 375. 1978; N. C. Nair, Fl. Punjab Pl.: 279. 1978; C.J. Saldanha & Nicolson, Fl. Hassan Dist.: 729. 1978; Britto & K. M. Matthew in K. M. Matthew, Fl. Tamil Nadu Carnatic pt. 2. 3: 1854. 1983; G. P. Roy, Grass. Madhya Pradesh: 88. 1984; B. M. Wadhwa & al. in H. J. Chowdhery & B.M. Wadhwa, Fl. Himachal Pradesh 3: 824. 1984; B. D. Sharma & al., Fl. Karnataka Anal.: 330. 1984; Deshp. & N. P. Singh, Grass. Maharashtra: 58. 1986; Mooney, Suppl. Bot. Bihar Orissa: 160. 1986 (repr. ed.); R. S. Rao, Fl. Goa Diu Daman Dadra Nagar Hav. 2: 500. 1986; N. P. Singh, Fl. E. Karnataka 2: 686. 1988; Karth. & al., Fl. Ind. Enum. Monocot.: 216. 1989; Sreek. & V. J. Nair, Fl. Kerala - Grass.: 380. 1991; G. P. Roy & al., Fl. Madhya Pradesh: 525. 1992; R. P. Pandey in B. V. Shetty & V. Singh, Fl. Rajasthan 3: 1047. 1993; B. D. Sharma & al., Fl. Maharashtra St. Monocot.: 483. 1996; U. Shukla, Grass. N. E. India: 255. 1996; P. Singh in Hajra & D. M. Verma, Fl. Sikkim 1: 289. 1996; S. Moulik, Grass. Bamb. India 2: 602. 1997; T. Pullaiah, Fl. Andhra Pradesh 3: 1195. 1997; K. T. Mathew in K. M. Matthew, Fl. Pulney Hills: 1489. 1999. *Poa gangetica* Roxb., Fl. Ind. 1: 341. 1820. TYPE: India, banks of Ganges, *Roxburgh*, s.n. (holo. BM). *Eragrostis stenophylla* Hochst. ex Miq., Verh. Konink. - Nederl. Inst. 3, 4: 39. 1851, p.p.; Hook. f., Fl. Brit. India 7: 318. 1896; Prain, Bengal Pl. 2: 1222. 1908 (repr. ed. 2: 922. 1963); Haines, Bot. Bihar Orissa pt. 5 & 6: 959. 1925 (repr. ed. 3: 1004. 1961); T. Cooke, Fl. Bombay 3: 547. 1958 (repr. ed.). TYPE: India, Mangalore, *Hohenacker*, *R.F.* 664 (BM: BM000959505).

Culms tufted, geniculate, 40 - 50cm high; nodes brownish; internodes 6 - 9cm long. Leaves linear to lanceolate, 7 - 12 $\times$ 0.3 - 0.5mm, apex acuminate, base rounded to subcordate, margins eglandular, upper surface scabrid; leaf sheaths 3 - 7cm long, mouth bearded; ligule 0.2 - 0.4mm long membranous, with fimbriate margins. Panicles lax to effuse, 4 - 15 $\times$ 4 - 6cm, branches alternate, capillary, 6 - 10cm long, angled, scabrid along angles, base and axils glabrous; peduncle 5 - 8cm long. Spikelets lanceolate to elliptic, 3 - 5 $\times$ 0.8 - 1.1mm, dull green; pedicels 2 - 5mm long, angled, scabrid along angles. Glumes deciduous, linear to lanceolate, apex acute, margins entire, chartaceous, 1-nerved, keeled, scabrid along keel towards apex, lower glume c. 0.8 $\times$ 0.2mm; upper glume c. 1 $\times$ 0.4mm. Florets 5 - 20, breaking from below upwards, loosely arranged on rachilla; rachilla slender, zigzag,

visible between florets. Lemmas deciduous, ovate, c. 1×0.5 mm, apex subacute to submucronate, margins entire, chartaceous, 3-nerved, slightly 1-keeled, glabrous along keel. Paleas persistent or subpersistent, elliptic, c. 1×0.3 mm, apex acute, margins entire, 2-nerved, 2-keeled, scabrous along keels. Lodicules 2, c. 0.75 mm long, apex truncate, white. Stamens 2; anthers up to 3 mm long, purplish; filaments c. 0.3 mm long, white. Ovary c. 0.1 mm long, pale green; styles c. 0.2 mm long, white; stigmas c. 0.3 mm long, white to cream coloured. Caryopses ovoid to ellipsoid, up to 0.4×0.2 mm, brownish.

Fl. & Fr.: Almost throughout the year.

Distribution : Native to tropical Asia and Africa; introduced in Colombia, Belize, U.S.A, Venezuela etc. INDIA: Andhra Pradesh, Bihar, Daman & Diu, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, West Bengal, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Habit & habitat : Annual. Grows in highly moist and damp situations, along paddy fields, river beds, stream margins, in wetlands, dry river beds, around stagnated water in black alluvial soil etc.; found at an altitude between 10 - 100 m.

Chromosome nos.: $2n=20$ (Dujardin, 1979); $2n=80$ (Tateoka, 1965).

Uses: Good fodder, used in broom making, at times becoming a noxious weed.

Specimens examined : ANDHRA PRADESH, Chittoor Dist.: Chandragiri, 23.02.1914, *coll.*?, 9997 (MH); East Godavari Dist.: Anigiri Village nearby forest, 200m, 25.09.1980, *G.V. Subbarao* 68552 (MH); Karimnagar Dist.: Aklasapur R.F., 200m, 30.12.1964, *G.V. Subbarao* 22511 (CAL & MH); Kurnool Dist.: Chenchukunda Pond, Digwametha- Nallamalais, 325m, 18.11.1969, *J.L. Ellis* 32513 (CAL & MH); Medhak Dist.: Pegarikutta-on the way- Narsapur, 713m, 23.09.1958, *K.M. Sebastine* 6655 (MH); Visakhapatnam Dist.: Mandasa Mandu, 15.10.1930, *V. Narayanaswamy* 4622; 4624 (MH); West Godavari Dist.: Gopanapalam, Sea level, 25.01.1958, *K. Subramanyam* 5159 (MH); KARNATAKA, South Kanara Dist.: 07.12.1919, *coll.*?, 16307 (MH); KERALA, Kasaragode Dist.: Cheruvathur, 125m, 26.09.1982, *R. Ansari* 74308 (MH); Palghat Dist.: 10.03.1965, *K.M. Sebastine* 22855 (CAL); Trivandrum Dist.: Veli, 75m, *M. Mohanan* 58553 (MH); MADHYA PRADESH, Damoh Dist.: 14.02.79, *B.K. Shukla* 29789 (CAL); Hoshangabad Dist.: Bori area nearby, 1000m, 06.10.1960, *J. Joseph* 11298 (CAL & MH); Saugor Dist. Bina river - Rahatgarh, 475m, 04.11.1960, *N.P. Balakrishnan* 11481 (MH); MAHARASHTRA, Nagpur Dist.: Bhide Tank, 250m, 13.11.1957, *K. Subramanyam* 4551 (MH); ODISHA, Sundargarh Dist.: Bhutura, 24.11.1987, *D. Namhata* 2672 (CAL); RAJASTHAN, Banswara Dist.: 22.10.1976, *V. Singh* 3788 (CAL); TAMIL NADU, Chenglapatu Dist.: Vandalur, 07.02.1915, *coll.*?, 11477; 11478 (MH); Ramanathapuram Dist. : Valantharavai, 50m, 07.02.87, *V. Balasubramanyam* 1178 (CAL & MH); Tirunelvely Dist.: Mundanthorai, 16.05.1901, *C.A. Barber* 2806 (MH); UTTAR PRADESH, Champaran Dist.: 26.11.1907, *J.H. Burkill* 29362 (CAL); WEST BENGAL, Howrah Dist.: 10.1894, *J.D. Hooker* 1311 (CAL); Malda Dist.: 29.10.1959, *G. Panigrahi* 20591 (CAL); Purulia Dist.: no date, *K.C. Malik* 993 (CAL).

3. *Eragrostis nutans* (Retz.) Nees ex Wight & Arn. in Wight's Cat.: 105. 1834; Nees ex Steud., Nomencl. ed. 2.1: 563. 1840; C. E. C. Fisch. in Gamble, Fl. Madras pt. 10: 1826. 1934 (repr. ed. 3: 1264. 1957); Bor, Grass. Burma Ceylon India Pakistan: 511. 1960; Deshp. & N. P. Singh, Grass. Maharashtra: 58. 1986; Karth. & al., Fl. Ind. Enum. Monocot.: 217. 1989; G. P. Roy & al., Fl. Madhya Pradesh: 527. 1992; R. P. Pandey in B. V. Shetty & V. Singh, Fl. Rajasthan 3: 1049. 1993; B. D. Sharma & al., Fl. Maharashtra St. Monocot.: 485. 1996; U. Shukla, Grass. N. E. India: 257. 1996; P. Singh in Hajra & D. M. Verma, Fl. Sikkim 1: 290. 1996; S. Moulik, Grass. Bamb. India 2: 605. 1997; Noltie, Bot. Robert Wight: 282. 2005. *Poa nutans* Retz., Obs. Bot. 4: 19. 1786. TYPE: India, *Koenig* s.n. (holo.- LD; fragment of type in K: K000643354). *Eragrostis elegantula* Nees ex Steud., Syn. Pl. Glum. 1: 266. 1854; Stapf in Hook. f., Fl. Brit. India 7: 318. 1896. TYPE: India, *Wight* s.n. (Herb. Wight. prop. No. 1781, K: K000245091).

Culms tufted, geniculate, 25 - 70 cm high; nodes brownish; internodes 3 - 8 cm long. Leaves linear to lanceolate, $4 - 7 \times 0.2 - 0.4$ cm, apex acuminate, base rounded to subcordate, margins eglandular, upper surface

scabrid; leaf sheaths 2 - 4cm long, mouth bearded; ligules membranous with minute ciliate rim, up to 0.3mm long, long ciliate behind. Panicle spiciform to narrowly contracted to effuse, 4 - 14 × 1 - 1.5cm, branches alternate, 1 - 4.5cm long, angled, scabrid along angles, base and axils glabrous; peduncle 5 - 14cm long, eglandular. Spikelets elliptic to lanceolate, 4.5 - 9 × 1 - 1.2mm, dull green to greyish; pedicels 0.5 - 1.5mm long, eglandular. Glumes linear to lanceolate, apex acute, margins entire, 1-nerved, keeled, scabrid along keel towards apex; lower glume 0.7 - 0.8 × 0.3 - 0.4mm; upper glume 0.9 - 1 × 0.3 - 0.4mm. Florets 8 - 12, breaking from below upwards, closely arranged on rachilla with overlapping margins; rachilla zigzag. Lemmas deciduous, ovate to lanceolate or elliptic, 1 - 1.3 × 0.4 - 0.5mm, apex acute, margins entire, chartaceous, 3-nerved, 1-keeled, scabrid along keel towards apex. Paleas persistent, elliptic to lanceolate, 0.9 - 1 × 0.3 - 0.4mm, apex acute to obtuse, margins entire, 2-nerved, 2-keeled, scabrous along keel. Lodicules 2, apex truncate to slightly dentate, white. Stamens 3 or 2; anthers 0.2 - 0.3mm long, purplish or brownish; filaments c. 0.3mm long, white. Ovary c. 0.3mm long, white; styles c. 0.3mm long, white; stigmas c. 0.4mm long, cream coloured. Caryopses ovoid to globose, c. 0.3 × 0.2mm, brownish.

Fl. & Fr.: Almost throughout the year.

Distribution : China, Himalayas, Japan, Malaysia, Philippines and Sri Lanka. INDIA: Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Habit & habitat : Perennial. In cultivated fields as a weed, also along forest margins, river banks, bunds of paddy fields, margins of scrub jungles and other similar habitats, usually found up to an altitude of about 325m.

Chromosome nos.: 2n=60 (Christopher & Abraham, 1974; Gould & Soderstrom, 1974).

Uses : Fairly good fodder.

Specimens examined : ANDHRA PRADESH, Chittoor Dist.: Kambakam - Foot Hills, 26.09.1974, *M. Chandrabose* 45128 (MH); Godavari Dist.: Bikkavolu, 07.06.1902, *C.A. Barber* 4371 (MH); Krishna Dist.: Ivanna, 05.02.1986, *P. Venkanna* 5921 (MH); Nellore Dist.: Kavali, 29.01.1929, *K.C. Jacob* 18374 (MH); Visakhapatnam Dist.: Palasamedu, 15.10.1930, *V. Narayanaswami* 4631 (MH); ODISHA, Ganjam Dist.: Pathwa-Gopallur Road Crossing, 20.10.1930, *V. Narayanaswami* 4687 (MH); KERALA, Kollam Dist.: Kollam, 22.05.1978, *C.N. Mohanan* 55729 (MH); Thiruvananthapuram Dist.: Kottur R.F., 04.04.1973, *J. Joseph* 44024 (MH); TAMIL NADU, Chenglepett Dist.: Kambakkam Hills, 05.05.1913, *coll.*?, 7855 (MH); Madurai Dist.: Kanavai-Alagar Hills, 12.06.1957, *K. Subramanyam* 3449 (MH); Ramanathapuram Dist.: Mathur-Karaikkudi, 28.11.1977, *N.C. Nair* 51765 (MH); Salem Dist.: Hosur Cattle Farm, 914 m, 07.06.1930, *V. Narayanaswamy* 2998 (MH); South Arcot Dist.: Cudallore-Marakkanam Road, 19.09.1979, *K. Ramamurthy* 64176 (MH); Thanjavur Dist.: Vallum, 07.01.1989, *S. Ragupathy* 918 (MH); Thirunelveli Dist.: Courtallam, 25.10.1919, *K.C. Jacob* 16245 (MH); WEST BENGAL, Bankuara Dist.: 28.09.65, *M.N. Sanyal* 815 (CAL).

ACKNOWLEDGEMENTS

Authors thank the Ministry of Environment and Forests, Govt. of India for financial assistance under their AICOPTAX scheme; Dr. Paramjit Singh, Director, Botanical Survey of India, Kolkata for facilities and encouragement; V. Ramesh, photographer, Botanical Survey of India (SRC), Coimbatore for helping in editing computer images of the species involved.

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इरेग्रोस्टिस एट्रोवारेंस, इरेग्रोस्टिस गेंजेटिका एवं इरेग्रोस्टिस नूटेंस के अभिनिर्धारण में विभ्रम

सी पी विवेक, जी वी एस मूर्ति एवं वी जे नायर

सारांश

इरेग्रोस्टिस एट्रोवारेंस, इरेग्रोस्टिस गेंजेटिका तथा इरेग्रोस्टिस नूटेंस के अभिनिर्धारण में विभ्रम के कारण विभिन्न पादपालयों में शीट्स में भ्रांतिपूर्ण अभिनिर्धारण एवं अन्यत्र भ्रान्त विवरण दिये गये हैं। व्यापक अध्ययन से इस समस्या का समाधान हो गया है। सारणी में तीनों जातियों के अन्तर दिखाए गए हैं। अभिनिर्धारण हेतु संकेत एवं प्रामाणिक विवरण तथा शूकिका और केरिओप्स के प्रतिरूप भी उपलब्ध कराए गये हैं।