AN UPDATED OVERVIEW ON CYTOLOGICAL AND CYTOGENETICAL ASPECTS OF *CORCHORUS* SP. (TILIACEAE)

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Abstract: *Corchorus* (Family: Tiliaceae) possessing more than 170 species are fibrous annual plants distributed in warm regions throughout the world. *Corchorus capsularis* L. (white jute) and *C. olitorius* L. (tossa jute) yields fibre of commerce (phloem fibre) from bark of the stem (commonly known as pat); while, few wild species found and grown in India are important genetic resources (*C. trilocularis* – abiotic stress tolerance, tolerant genotype to water inundation; *C. pseudoolitorius* and *C. pseudocapsularis* – fungal disease resistance; *C. tridens, C. trilocularis* and *C. aestuans* – fine fibre quality). India is an important producer of commercial jute and socio-economic significance is associated with the crop plant. With a view to fibre yielding importance of the cultivated species of *Corchorus* as well as considering the potentiality of wild members an updated overview is conducted only on cytological and cytogenetical (including plant type mutation) aspects to provide adequate necessary information to researchers interested in the field of conventional cytogenetics so that the methodology may be explored for effective utilization in crop improvement and human benefit.

Keywords: *Corchorus*, Overview, Cytology, Cytogenetics, Plant type mutation

REFERENCES

Ahmed, S.; Ahmed, Q.A. and Islam, A.S. (1983). Inheritance study of fibre colour, disease resistance and water logging tolerance in *Corchorus capsularis* L. for breeding a variety with snow white fibre. *Bangladesh Journal of Botany,* **12:** 207-215.

Akhter, R.; Haque, M.I.; Sarkar, R.H.; Alam, S.K.S. and Haque, M.M. (1991). Karyotype analysis in diploid and colchicine induced tetraploids of *Corchorus olitorius* and *C. capsularis*. *Bangladesh Journal of Scientific Researches,* **21:** 183-188.

Alam, S.S. and Rahman, A.N.M.R.B. (2000). Karyotype analysis of three *Corchorus* species. *Cytologia*, **65:** 443-6.

Anonymous. (2009-10). Annual report 2009-10, CRIJAF, Barrackpore, Kolkata. P. 16.

Arangzeb, S. (1994). Cross compatibility of eight wild species of jute with cultivars and among themselves. Ph.D. Thesis, University of Dhaka, Dhaka, Bangladesh.

Arangzeb, S. and Khatun, A. (1980). A short note on inter-specific hybridization between *C. trilocularis* and *C.capsularis*. *Bangladesh Journal of Jute & Fibre Research*, **5:** 85-89.

Basak, S.L. (1993). Review on the genetics and breeding of jute. International Jute Organization. Dakha. Bangladesh. Pp. 1-167.

Basak, S.L. and Biswas, P.K. (1968). Pairing behaviour of chromosome in autotetraploid of jute (*C. olitorius* L.). *Cytologia,* **33:** 50-53.

Basak, S.L.; Jana, M.K. and Paria, P. (1971). Inheritance of some characters in jute. *Indian Journal of Genetics and Plant Breeding,* **31:** 248-255.

Basak, S.L. and Paria, P. (1980). Desynapsis and spontaneous trisomy in jute (*Corchorus olitorius* L.). *Theoretical and Applied Genetics,* **56:** 253-256.

Bhaduri, P.N. and Chakravarti, A.K. (1948). Colchicine induced autotetraploid in jute *Corchorus capsularis* and *Corchorus olitorius* and the problem of raising improved varieties. *Science and Culture,* **14:** 212-213.

Chattopadhyay, S.; Chaudhury, S.K.; Gupta, D.; Hazra, S.K.; Kumar,D.; Mahapatra, A.K.; Mandal, N. and Saha, A. (1999). Crop improvement. *In:* "Fifty years of research". CRIJAF, Barrackpore. Pp. 40-63.

Chowdhury, S.K.; Kumar, D. and Saha, A. (2004). Varietal development and improved varieties of jute. CRIJAF publication, *Technical Bulletin Series,* **1:** 1-12.

Das, P.K. (1972). Trisomic analysis in jute cytological behavior of trisomic hybrids from F_3 and F_4 progenies of the cross between *Corchorus olitorius* and *Corchorus capsularis*. *Nucleus,* **15:** 163-7.

Das, P.K. and Iyer, R.D. (1972). Studies on trisomics in a jute hybrid. *Genetica,* **43:** 473-88.

Datta, R.M. (1952). Meiosis in *C. capsularis*. *Science and Culture,* **18:** 385-386.

Datta, R.M. (1965). Cytogenetical studies on autotriploid (2n × 4n) *olitorius* jute (*Corchorus olitorius* Linn. strain chinsurah green). *Theoretical and Applied Genetics,* **34:** 335-340.

Datta, R.M. (1966). Investigation on the autotetraploids of the cultivated and the wild types of jute **(***Corchorus olitorius* Linn.and *C. capsularis* Linn.**).** *Theoretical and Applied Genetics,* **33:** 17-33.

Datta, R.M. and Banerji, S.N. (1960). On the cause of seed failure or seed setting in 4n cultivated *Corchorus capsularis* L. X 2n cultivated *C. capsularis* and 4n cultivated *C. olitorius* L. X 2n cultivated *C. olitorius* and their reciprocals through cyto-genetical studies. *Genetica,* **31:** 385-409.

Datta, R.M. and Choudhury, M.R. (1966). Seed failure following hybridization between 4n *Corchorus capsularis* L. (strain D. 154) and 3n *C. olltorius* L. (strain C. G.) and its reciprocal and some cytonetical observations. *Biology Bulletin of the Academy of Sciences Bohemoslov,* **8:** 288-91.

Datta, R.M. and Sen, S.K. (1961). Interspecific hybridization between *Corchorus sidoides* F. Muell. and *C. siliquosus* L., a natural polyploidy. *Euphytica,* **10:** 113-119.

Datta, R.M.; Mukhopadhaya, D.; Panda, B.S. and Sasmal, P.K. (1975). Cytotaxonomic studies of different *Corchorus* (jute) species. *Cytologia,* **40:** 685-692.

Edmonds, J.M. (1990). Herbarium survey of African *Corchorus* species: Systematic and eco-geographic studies in crop gene pools. International Board of Plant Genetic Resources. Rome, Italy. Pp. 2-3.

Faruqui, S. (1962). Interspecific hybridization between *C. olitorius* and *C. walcotti* F.V.M. and *C. trilocularis* × *C. capsularis*. M.Sc. Thesis, Sind University, Pakistan. P. 105.

Ganguli, J.K. (1945). A note on the secondary association of chromosomes and the basic number in *Corchorus capsularis. Science and Culture,* **11:** 272.

Hassain, M.M.; Wagner, M.H.; Zaman, H.U. and Khan, M.A. (2000). Study on the performance of hybrid jute/betel nut fiber reinforced polypropylene composites. *Journal of Adhesion Science and Technology,* **25:** 615-626.

Haque, M. and Islam, A.S. (1970). Some promising material among F_4 and back-cross derivatives of the natural hybrid *C. aestuans* × *C. olitorius*. *Sindh University Research Journal (Science Series),* **4:** 97-107.

Hazra, S.K. and Karmakar, P.G. (2008). Cytogenetics, mutagenesis and genetics of qualitative characters of jute and allied fibres. *In:* Jute and Allied Fibres Updates: Production and Technology. Karmakar, P.G., Hazra, S.K., Ramasubramanian, T. Sinha, M.K. and Sen, H.S. (Eds.). Pp. 46-56.

Hossain, M. and Sen, S. (1978). Radiation induced high fibre yielding chlorophyll mutant in jute. *Indian Journal of Genetics and Plant Breeding,* **38:** 179-181.

Islam, A.S.; Jahan, B. And Chowdhury, M.K.U. (1981). Attempt to produce polyploids from a spontaneous amphidiploid of the jute hybrid, *C. olitorius* × *C. depressus. Bangladesh Journal of Botany,* **10:** 63-68.

Islam A.S. and Rashid, A. (1960). First successful hybridization between the two jute yielding species, *Corchorus olitorius* (Tossa) × *C. capsularis* (White). *Nature,* **185:** 258-259.

Islam, A.S. and Sattar, M.A. (1961). Interspecific hybridization in the genus *Corchorus*: *C. aestuans* × *C. capsularis*, (pp. 6-7) Proceeding XIII Pakistan Science Conference, Dacca, Pakistan, 11 January 1961. Dacca.

Islam, A.S.; Shah, N. and Haque, M. (1973). Origin of spontaneous amphidiploid in the F_3 progeny of the cross, *C. olitorius* × *C. depressus. Bangladesh Journal of Botany,* **2:** 41-50.

Iyer, R.D. (1968). Towards evolving a trisomic series in jute. *Current Science*, **37:** 181–183.

Jacob, K.T. and Sen, S. (1961). Haploidy in jute (*Corchorus olitorius* L.). *Nature,* **192:** 288-289.

Karmakar, P.G.; Hazra, S.K.; Ramasubramanian, T.; Mandal, R.K.; Sinha, M.K. and Sen, H.S. (2008). Jute and Allied Fibre Updates: Production and Technology. CRIJAF, Brrackpore, India. 327p.

Khatun, A. (2007). Recent agricultural developments in jute, kenaf and mesta through traditional and biotechnological approaches. pp. 1-13. A seminar on jute and kenaf held in Myanmar organized by the Ministry of Agriculture and Irrigation, Myanmar Jute Industries and the International Jute Study Group (IJSG). Myanmar. 7 February 2007.

Kumar, D.; Paria, P. And Basak, S.L. (1981). Genotypic control of chromosome behaviour in *Corchorus olitorius* L. *Cytologia*, **46:** 643-647.

Kundu, B.C. (1951). Jute — world's foremost bast fibre, II. Technology, marketing, production and utilization. *Economic Botany,* **10:** 203-240.

Kundu, B.C. and Sharma, M.S. (1956). Studies on colchicine induced tetraploids of *Corchorus olitorius* Linn. (Jute). *Journal* of the *Indian Botanical Society*, **33:** 11-26.

Mahapatra, A.K. and Saha, A. (2008). Genetic resources of jute and allied fibers crops. Jute and allied fibers updates: production and technology. Barrackpore, Kolkata. P. 327.

Mahapatra, A.K.; Saha, A. and Basak, S.L. (1998). Origin, taxonomy and distribution of *Corchorus* species in India. *Green Journal*, **1:** 64-82.

Maity, S. and Datta, A.K. (2008). Cytomorphological studies in F_1 hybrids (*Corchorus capsularis* L. × *Corchorus trilocularis* L.) of jute (Tiliaceae). *Comparative Cytogenetics*, **2:** 143-149.

Maity, S. and Datta, A.K. (2009a). Meiosis in nine species of jute (*Corchorus*). *Indian Journal of Science and Technology,* **2:** 27-29.

Maity, S. and Datta, A.K. (2009b). Spontaneous desynapsis in *Corchorus fascicularis*. *Indian Journal of Science and Technology,* **2:** 34-36.

Maity, S. and Datta, A.K. (2009c) Induced viable macromutants in *Corchorus capsularis* L. *Journal of Phytological Research,* **22:** 43-46.

Maity, S. and Datta A.K. (2010). Cytomorphological studies in F_2, F_3 and induced amphidiploid of jute (*Corchorus trilocularis* L. X *Corchorus capsularis* L.). *Nucleus,* **53:** 85–87.

Nakajima, G. (1949). Tetraploid plants of jute and China jute raised by colchicine method. *Japanese Journal of Genetics*, **2:** 121-131.

Nandi, H.K. (1937). Trisomic mutation in jute. *Nature*, **140:** 973-974.

Panda, B.S. and Datta, R.M. (1962). Meiotic chromosome pairing in the population of 2n × 4n *Corchorus olitorius* strain C.G. *Indian agriculturist,* **6:** 31-34.

Paria, P. and Basak, S.L. (1973). Genotypic control of chromosome behavior in *Corchorus capsularis*. *Nucleus,* 16: 210-5.

Paria, P. and Basak, S.L. (1979). Identification of seven primary trisomic of jute. *Indian Journal of Genetics and Plant Breeding,* **39:** 178-187.

Paria, P.; Basu, M.S.; Chattopadhyay, S. and Basak, S.L. (1978). Genetic control of artificially induced desynapsis in jute (*Corchorus olitorius* L.). *Current Science*, **47:** 916-917.

Purseglove J.W. (1968). Tropical Crops. Dicotyledons 2. Longhman, London, 613–618.

Rakshit, S.C. (1967). Induced male-sterility in jute (*Corchorus capsularis*). *Japanese Journal of Genetics*, **42:** 139-142.

Rao, N.S. and Datta, R.M. (1953). Chromosomes of the genus *Corchorus*. *Nature*, **13:** 754.

Rao, N.S. and Kundu, B.C. (1949). Effect of gammexane on the root-tips of *Corchorus capsularis* Linn. *Science and Culture*, **14:** 484.

Samad, M.A.; Kabir, G. and Islam, A.S. (1992). Chromosome banding in two species of *Corchorus* and their F1 hybrid. *Bangladesh Journal of Botany*, **9:** 113-117.

Sharma, M.S. and Datta, R.M. (1953). Complex chromosome mosaic and variable microsporocytes in *C. capsularis* L. *Science and Culture*, **10**: 202-203.

Sharma, A.K. and Roy, M. (1958). Cytological studies on jute and its allies. I Agron. Lusitana 20, 5-15.

Singh, D.P.; Sharma, B.K. and Banerjee, S.C. (1973). X-ray induced mutations in jute (*Corchorus capsularis* and *Corchorus olitorius*). *Genetica Agraria*, **27:** 115-147.

Sinhamahapatra, S.P. (2005). Development of desirable strain in jute *C. capsularis* L. using mutants in cross breeding. *Journal* of *Nuclear Agriculture and Biology*. **34:** 111-114.

Swaminathan, M.S. and Iyer, R.D. (1961). Skewed recombination in a rare interspecific hybrid. *Nature*, **192:** 893-894.

Thakare, R.G.; Joshua, D.C. and Rao, N.S. (1974). Radiation induced trisomics in jute. *Indian Journal of Genetics and Plant Breeding*, **34:** 337–345.

Wallace, D.R. (1909). Romance of jute 1909 cited in *Jute in India* by B.C. Kundu, K.C. Basak and P.B. Sarkar. Indian Central Jute Committee. Calcutta. P. 4.