

Genus Datasheet

Datasheet No. A-073.002
(Family.Genus)

DBT- Network Programme

1. Genus: *Allium* L.

2. Systematic Position:

APG IV (2016)

- Kingdom: Plantae
- Clade: Angiosperms
- Clade: Monocots
- Order: Asparagales Link
- Family: Amaryllidaceae J. St.-Hil.
- Subfamily: Allioideae Herb.
- Genus: *Allium* L.

Bentham and Hooker (1862)

Kingdom: Plantae
Division: Phanerogamia
Class: Monocotyledones
Series: Coronarieae
Ordo: Liliaceae Juss.
Genus: *Allium* L.

3. Species:

Global: ~860 species

India: 38

4. Taxonomic riddles:^{3,4,6,7,8,19}

5. Distribution:

Global: Northern Temperate and Alpine regions

India: Himalayas, Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Assam, Meghalaya, Nagaland, Uttaranchal, Punjab, West Bengal, Arunachal Pradesh, Tripura

6. **Habit and Habitat:** Bulbous herbs, height ~8cm to 1m; Temperate

7. **Economic Importance:** Condiment, ornamental, culinary, spice and vegetable, medicine

8. DNA content range:

2C (20.57 – 68.69 pg)^{1,3,4,78-81,99,114-116,216,217}

Methodology:

Feulgen cytophotometry^{1,3,4,78-81,93,216}

4C (66.32 – 121.79pg)^{1,3,4,78-81,93,98,114-116,216}

Flow cytometry^{81,99,115,116,217}

Feulgen microdensitometry

9. Basic chromosome number(s): $x=7^{37,199}$

$x=8^{5,23,37,38,53,65,66,84,103,184,217,226,242}$

$x=9^{37}$

$x=10^{198}$

10. Zygotic chromosome number(s):

$2n=12^{256}$

$2n=14^{3,4,7,23,83,103,168,169,199,207,295}$

$2n=16^{1-11,13,14,18-24,26-29,34,35,37,38,41,45,46,50-54,58-63,}$

$2n=16^{78-82,85-95,98-106,108-110,114-179,182,184-186,200,201,209,212-215,224,226,230,231,236-238,241-}$

$2n=16^{252-264,269-280,290,293}$

$2n=20^{198,199}$

$2n=22^{3,4,7,31,42-44,103,186,199,202-206}$

$2n=24^{8,9,13,14,23-26,55,56,173,174,186,187,193,226,251,273,286}$

$2n=28^{3,98,103,120,127,169,199,208,209}$

$2n=32^{2-10,12-14,17,20,23,31,32,34,37,45,48,49,57,65-72,86,99,107,110-112,120,123,139,141,149,168,186-197}$

$2n=32^{218-226,228,229,231,233,235,237-239,241-244,247,249,250,272,275,281,282,284,285,287-290,294}$

$2n=33^{199}$

$2n=36^{7,31}$

$2n=40^{12,225-227,229,231}$

$2n=44^{199,205}$

$2n=48^{7,8,10,13,14,31,69,225-227,229,231,283}$

$2n=56^{229}$

11. Gametic chromosome number(s):

$$n = 6^{180}$$

$$n = 8^{2,5,9,11,15,16,18,19,21-23,36-38,40,47,50,52-54,58,93,96,97,181,209,231,269,277,287,296}$$

$$n = 14^{209,210}$$

$$n = 16^{5,7,37,38,48,49,57, 65-68,72,113,240,289,292}$$

$$n = 32^{291}$$

12. Specialized chromosomes (B chromosomes/Sex chromosomes/Polytene chromosomes/ N chromosomes): B chromosome^{10,46,83,94,232,238,242,243,276,277,279,295}

13. Ploidy level:

Diploid^{1-7,10,11,18-26,34,37,38,46,50-54,58- 60,63,78-82,}

Diploid^{93,94,98,103,114-116,174,184,198,199,217,226,230,238,241-243,258,276,279}

Triploid^{23,24-26,33,55,56,174,193,226,251}

Tetraploid^{2-7,12,20,23,32-34,37,38,48,57, 65-72,98,103,111,112,191,193,199,216,217,}

Tetraploid^{219,224-226, 228,229,231,233,238,241-243}

Pentaploid^{225-227,229,231}

Hexaploid^{69,225-227,229,231}

Heptaploid²²⁹

Octaploid^{73,241}

14. Nature of polyploidy (auto, segmental, allo, autoallo):

Autopolyploid^{5-7,12,34,56,57,66,67,69,71,72,112,149,232,242}; Allopolyploid^{6,48}; Segmental Allopolyploid
Numerical variants of segmental allotriploid⁴; Numerical hybrid⁵⁵; Segmental autopolyploid²³

15. Aberrant chromosome number(s) (aneuploidy, aneusomy, polysomy): 2n=30³¹; 2n= small chromosomes in EMCs⁵²; Polysomy with 2n=72³¹; Aneuploids 2n=31, 33^{9,13,66,192}; An

Meiosis: 26,31,32,34,37-39,42,43,65-72, 93,103,111,113,143,149,184,206,234,242, 256,258,

17. Banding pattern(s): Giemsa C- banding^{30,60,93,143,145,152,174,233,276,279}, CMA/DAPI/AMINOR and telomeric region¹⁷⁷, Silver staining^{233,258}

18. Physical mapping of chromosomes: 45S and 5S rDNA localization by fiber FISH⁷⁶, 18S, 5S rDNA localization by ISH¹⁶¹, 45 S and 5S rDNA localization by fiber FISH⁷⁶, 45 S and 5S rDNA tandem repeats and Cot-1 DNA localization by dual color FISH¹⁸⁴, localization of 375bp repeat FISH¹⁸³

GISH:

19. Phylogenetic relationship at Chromosomal; DNA level: Chromosome level^{23,25,26,51,60}, DNA level^{64,74,75,77,79,99,217,297}

20. Cytogenetic mechanism(s) underlying evolution: *Allium* species shows very little variation in the symmetry of their chromosomes within as well as between their complements. There are mainly nucleolar chromosomes in the genus; in some species they also carry heterozygosity. Species with supernumerary B-chromosomes are mainly diploids. Occurrence of I's, II's and Multivalent repeats in some species. Desynapsis have been reported in some diploid and polyploid species causing irregular meiosis. Occurrence of translocation heterozygotes are also reported to occur. Presence of highly complex associations involving all 16 chromosomes has given rise to some sterile cytotypes propagating via vegetative means.

21. Linkage map:

22. Any other information: Pollen stainability- 7%¹⁸; 4.5%²¹; 83-95%²², 95.9%²⁸⁰, 100%⁵, P chromosome mitosis revealed 16 chromosomes in most of the tetraploid material¹⁴⁹, Pollen grain mitosis revealed 16 chromosomes in some tetraploid material¹⁴⁹, Pollen grain mitosis showing 14 chromosomes²¹¹