

Species Datasheet

Datasheet No. A-073.002.035
(family.genus.species)

DBT- Network Programme

-

1. Taxon:

Species *Allium tuberosum* Rottler ex Spreng.

Subspecies

Variety

Cultivar

Hybrid

Image file

2. Synonyms: *Allium angulosum* Lour., *A. argyi* H.Lev., *A. chinense* Maxim., *A. clarkei* Hook.f., *A. roxburghii* Kunth, *A. sulvia* Buch.-Ham. ex D.Don, *A. tricoccum* Blanco, *A. tuberosum* Roxb., *A. tuberosum* f. *yezoense* (Nakai) M.Hiroe, *A. uliginosum* G.Don, *A. yezoense* Nakai, *Nothoscordum sulvia* (Buch.-Ham. ex D.Don) Kunth

3. 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.
- Species: *A. tuberosum* Rottler ex Spreng.

Bentham and Hooker (1862)

Kingdom: Plantae
Division: Phanerogamia
Class: Monocotyledones
Series: Coronarieae
Ordo: Liliaceae Juss.
Genus: *Allium* L.
Species: *A. tuberosum* Rottler ex Spreng.

4. Distribution:

Global: Himalayas in Pakistan to China and Japan

India: Himalayas, Himachal Pradesh, Jammu and Kashmir, Meghalaya, Punjab, Tripura and Uttaranchal,

5. Indigenous/Exotic/ Endemic; Cultivated/Wild: Wild, occasionally cultivated

6. Threat Status:

IUCN: Not been assessed yet

BSI:

7. Habit and Habitat: Herbaceous, height ~ 16-45 cm; Temperate, on open rocky slopes, open meadows and on moist sandy soils between 1900 m and 2600 m altitude.

8. Life Form: Bulbous geophyte.

9. Economic Importance: Culinary herb, used as medicine, salad, vegetables, seed is used in spermatorrhoea

10. Probable Progenitor of:

11. DNA

C- value

2C (30.36 pg)^{3,4}

4C (121.47±1.57 pg)^{3,4}

4C (109.36 pg)¹

Methodology

Feulgen Cytophotometry^{1,3,4}

12. Basic chromosome number(s): $x = 8$ ^{2,5, 37,65,66}

13. Zygotic chromosome number(s):

$2n = 16$ ²⁴⁴

$2n = 32$ ^{2,3,4,5,6,7,9,13,14,20,23,34, 37,45,65,66,67,68,69,70,71,72,141,168,186,192,244,284,287,288,289,290}

$2n = 24$ ²⁸⁶

$2n = 31, 33$ ^{9,13,66,192}

$2n = 48$ ⁶⁹

$2n = 61-64$ ⁷³

$2n = 62$ ¹⁹²

$2n = 64$ ²⁹¹

14. Gametic chromosome number(s):

$n = 8$ ²⁸⁷

$n = 16$ ^{5,7,13,37,38,65,66,67,68,72,289,292}

$n = 32$ ²⁹¹

15. Specialized chromosomes (B chromosomes/Sex chromosomes/Polytene chromosomes/Neocentric chromosomes):

Image file

16. Ploidy level: Tetraploid^{2,3,4,5,6,7,20,23,34,37,38,65,66,67,68,69,70,71,72}, Hexaploid⁶⁹, Octaploid⁷³

Image file

17. Agametoploidy

18. Nature of polyploidy (auto, segmental, allo, autoallo): Autotetraploid^{5,6,7,34,66,67,69,71,72}, Autopolyploid⁶⁹

19. Genomic formula:

20. Aberrant chromosome number(s) (aneuploidy, aneusomaty, polysomaty): Aneuploids $2n=31$, 33 ^{9,13,66}, Aneusomaty with $2n=30$ ⁶⁷; Hexaploid cytotype $2n=48$ reported from seedlings obtained from open pollinated hypo-tetraploid ($2n=31$)⁶⁹; Double hypo-polyploid $2n=4x=30$ ⁷⁰

21. Somatic chromosomes:

Karyotype Majority metacentric chromosomes^{2,6,20,23,34,70}, majority submetacentric chromosomes⁶⁹, majority metacentric or submetacentric chromosomes⁷⁰

Chromosome size Medium²⁰ or large²³ or large to very large^{6,34,69,70}

NOR chromosome(s) 3 NOR⁷⁰, 4 NOR^{2,70}, 6 NOR⁶⁹, 12 NOR³⁴

Degree of asymmetry: Stebbin's 2B category³⁴

Image file

22. Banding pattern(s):

Image file

23. Physical mapping of chromosomes:

In situ hybridization

Image file

Fluorescent in situ hybridization

Image file

24. Genomic in situ hybridization:

Image file

25. Linkage map:

Image file

26. Chromosome associations:

Female meiosis

Male meiosis Majority 8 IV^{2,5,13,67}, II's and I's also seen ^{2,5,67}; 8 IV ⁷; 8 IV or 3-7 IV per PMC or 32 I ³⁷; 8 IV or 16 II or 32 I ⁶⁵; 8 IV in majority or 32 I or multivalent (III to VI) and II's in PMC with normal chromosome number, 32 II in few PMC and majority of EMC with 64 chromosomes ⁷⁰; 8 IV or 32 I ⁷¹; in PMC majority IVs and III's, few 32 I ⁷²; 32 II in EMC with 64 chromosomes ⁷²

In parent and progeny plant with 2n=32: 8IV or 32I or 0-5 I+ 0-10 II+ 0-1 III+ 3-7 IV, **In Aneuploid plant with 2n=31:** 31 I in majority of PMC (31 chromosomes) and 31 II in PMC with 62 chromosomes, **In Aneuploid plant with 2n=33:** multivalent apart from 33 I in PMC with 33 chromosomes and 33 II in PMC with 66 chromosomes ⁶⁶,

In an abnormal plant with high flower abortion in some inflorescence: Majority of PMC with 2n=32, rest with 8-33 chromosomes, multivalent (III's to VIII's) apart from II and I noted ⁶⁸

In hexaploid cytotype: 48 I in majority PMC with 2n=48 and rest 8 VI, 48 II in PMC with 96 chromosomes ⁶⁹

In double hypo-polyploid 2n=4x=30: 30 I or multivalent (III's to VI's) and II's in PMC with 30 chromosomes, 30 II in PMCs with 60 chromosomes ⁷⁰

Image file

27. Chromosome distribution at anaphase I: Irregular^{5,13,37,66}; Majority regular^{67,70}; Regular in PMC/EMC with double chromosome number (64 chromosome)⁷⁰; Slightly irregular in male meiosis normal in female meiosis⁷²

In the aneuploid plants: Regular in PMC with 62 and 66 chromosomes⁶⁶;

In an abnormal plant with high flower abortion in some inflorescence: 16:16 or 17:15 in PMC with 32 chromosomes, Normal (32:32) in PMC with 64 chromosomes, Abnormal in PMC with 19,20,28,30 and 31 chromosomes⁶⁸

In hexaploid cytotype: Irregular in PMC with 48 chromosomes, regular in PMC with 96 chromosomes⁶⁹

In double hypo-polyploid $2n=4x=30$: Irregular⁷⁰

28. Genetic diversity:

Chromosomal level

Image file

DNA level

29. Any other information (Apomixis; Inversion; Male sterility; Pollen grain mitosis; Pollen stainability; Translocations etc): Pollen stainability --49.3 to 75 %^{2,67}; 80%⁵; 87%³⁷; 13 to 19% in flowers from seed and 60-67% in flowers from bulb⁶⁵; 82.5 %⁷⁰; 86.6% in Parent plant ($2n=32$), 56.5% in Aneuploid plant with $2n=31$, 31.78 to 33.5 % in Aneuploid plant with $2n=33$ ⁶⁶; 0.07% in an abnormal plant with high flower abortion in some inflorescence⁶⁸; In hexaploid cytotype: 1.33%⁶⁹; In double hypo-polyploid $2n=4x=30$: 56.47%⁷⁰