
Summary and Conclusions

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Genus **Wiesneria** belonging to the most primitive monocot family Alismaticeous, is represented by three species viz. **W. filifolia**, **W. schweinfurthii** and **W. triandra**. **Wiesneria triandra** is an interesting species found both in Africa and India. It is considered to be a rare species in India, however, present investigation revealed that it is a common species growing in every ditch on laterite of Konkan area of Maharashtra and is in no way rare and vulnerable as stated by C.D.K. Cooke (1980) in his monitoring on the status of some Indian endemic plants.

Genus **Wiesneria** belonging to Tribe Wiesneriinae (Pichon, 1946) is considered to be a highly specialized Alismaticeous genus (Eams, 1961). Observations on morphology of **W. triandra** revealed that the genus is specialized through process of reduction. The genus **Wiesneria** represents the simplest leaf form in family Alismaceae. Alismatidae exhibit trends toward sterilization of inflorescence. In **Wiesneria**, there is general trend towards reduction.

Wiesneria triandra shows functional unisexual flower. The species further represents advancement over its allies in their reduction in carpel numbers from 6-1 as compared to numerous carpels in other members of Alismataceae. The variations in number of petals, stamens and seldom occurrence of functionally bisexual flowers support that **W. triandra** is specialized through reduction. Uniovulate carpels are considered to be highly specialized in Alismataceae. **W. triandra** has uniovulate carpels. Thus morphological evidences

supports Pichon (1946) in placing genus **Wiesneria** into an advanced tribe of Alismatidae **Wisneriinae**.

It has been revealed from the cytological studies of **Wiesneria triandra** that karyotype is reasonably asymmetrical and indicate advanceness in general. **Wiesneria triandra** differed from all other genera of Alismataceae studied ^{by} sharma a chatterjee (1967) in having submedian type marker chromosome and two long chromosomes of median type. Present investigation of **W. triandra** supports the view that Alismatales is having highly advanced taxa evolving in divergent direction. It is further concluded that **W. triandra** is still in the process of stabilization with the help of chromosomal alterations as the prime mechanism.

Pollen grains of **Wiesneria triandra** fall under 2a type of pollen (Argue, 1976). The pollen grains are pantoporate with Ca 24 apertures on pentagonal or hexagonal surfaces. pollen grains are shade in 3 nucleate condition. Thus, palynological studies on **W. triandra** also support the view ^{that} the Alismatidae is scarcely on main line of evolution, but represents a highly specialized side branch which has retained some most primitive characters.

Studies on vegetative anatomy have revealed that there is reduction in vascular tissue in general. **W. triandra** shows all the anatomical peculiarities ^{possessed by} aquatic plants. Presence of laticifers, squammules and tannin cells is characteristic of Alismataceae. They are also found in the species. Leaves are amphistomatic and isobilateral. The stomata are paracytic. Hydropten reported in several members of Alismataceae was not observed in **Wiesneria triandra**.

Developmental anatomy of achene in **Wiesneria triandra** is peculiar. The form and structure of achene can be well correlated with dispersal of seeds, seed dormancy and seed germination.

Studies on floral anatomy revealed that there is gradual reduction in vasculature to floral parts. The vasculature to flower is similar to other members in essential features. The vasculature of carpel revealed that there is great reduction. Each carpel receives single traces which bifurcates forming two traces of which one supplies to funiculus and other to carpel wall as a dorsal bundle. Carpels ventrals are absent. This also supports the view that **Wiesneria** is a highly advanced taxa in Alismataceae.

Embryological investigation have revealed that the characteristic embryological events of Alismataceae are also shown by **Wiesneria triandra**. The embryology is very similar to **Sagittaria guayanensis**, **S. latifolia**, **S. sagittifolia** and other members of Alismataceae. The embryological features of **Wiesneria** can be summarised as follows.

- 1) The anthers are tetrasporangiate with four groups of archesporial cells. The primary parietal layer give rise to endothecium, single middle layer and tapetum. The middle layer degenerates early and the tapetum is of amoeboid type forming periplasmodium.
- 2) The microspore mother cells undergoes normal meiotic division. The cytokinesis is of successive type. Pollen tetrads are of isobilateral type.

3) The young pollens are small with dense cytoplasm and centrally placed nucleus. The microspore nucleus divides into generative and vegetative nucleus. Generative nucleus divides and form 2 sperms. Pollen are shade in 3-celled condition.

4) Ovules are anatropous and bitegmic Archeporial initial directly functions as megaspore mother cell.

5) The lower dyad cell is functional. The nucleus divides twice mitotically forming 2 nuclei at micropylar end and two at chalazal end. The two micropylar nuclei undergoes third mitotic division forming 4 nuclei out of which 3 form egg apparatus and 4th behaves as polar nucleus. The chalazal one or both nuclei may or may not under go third mitosis and embryosac with 1-3 antipodals is observed. Embryo sac development is of **Scilla** type.

6) Double fertilization occurs. The endosperm development is of Helobial type.

7) The development of embryo is of **Alisma** type.

Present morphotaxonomical studies have revealed that **Wiesneria Triandra** has combination of characters of various genera of Alismataceae. It is not closely related to any other genus in the family. It is specialized in many characters through reduction. The trend of elaboration found in other genera of Alismataceae is not found in **Wiesneria**. It represents most simple leaf form, however, it is advanced through reduction. Similarly stant (1966) in her anatomical studies of 14 genera of family Alismataceae has shown that **Wiesneria schweinfurthii**, an another species has low degree of correlation with all other members of family Alismataceae.

Aponogeton satarensis is an interesting Asiatic species. It differs from all other asiatic species in its distribution habit and biforked inflorescence. **A. satarensis** is closely allied to **A. decaryi** from madagascar. It is restricted to plateaus of Sahydri in Satara district of Maharashtra and needs conservation.

A. satarensis is also interesting from cytological point of view in having low number of chromosomes. The anatomical characters are very similar to other species of **Aponogeton**. the peculiar anatomical characters of aquatic plants were observed. anatomical studies revealed the presence of lacunose tissue with simple $\overleftrightarrow{\text{diaphragms}}$, presence of laticifers in all the arieal parts, Tannin cells both in arieal and underground parts and general reduction in vascular tissue. The leaves are dorsiventral and epistomatily. The stomata are paracytic arranged in rows.

Embryological events can be summarized as follows.

- 1) The anther development is of monocotyledon type. The tapetum is of amoeboid type cytokinesis is of successive type while pollen tetrads are of isobilateral type.
- 2) Development of male gametophyte includes vacuolation of pollen during enlargement and shifting of nucleus to one side of pollen. the nucleus divides forming vegetative and generative nucleus. The generative nucleus divides forming 2 sperms. Pollen grains are shade in 3-celled condition.

3) The ovules are bitegmic, anatropous and crassinucellate. Single archesporial cell divides and give rise to parietal cell and megaspore mother cell. Megaspore mother cell undergoes normal mitotic division and forms linear tetrad of 4 megaspores. The nucleus of functional chalazal megaspore undergoes 3 mitosis and form 8 nuclei which organise into normal type of embryo sac.

Endosperm development is of helobial type. Embryogeny is peculiar. The zygote divides transversely forming ca 4 cb. Basal cell enlarges in size, its nucleus become hypertrophied and acts as suspensor cell. The apical cell divides by two longitudinal walls at right angle to each other followed by transverse division forming celled globular embryo. The mature embryo has the form characteristic the Helobiales.

Affinity of Aponogetonaceae to Helobiae is undoubtful but is relation-ship with other families of Alismatiadae is not well understood.
