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Summary and Conclusion

The family Liliaceae economically ranks very high as it possesses hundreds of species and varieties that man uses for different purposes. The genus Urginea is one of them, which is extremely interesting polytypic genus represented by hundred species, (Airy Shaw, 1966).

Urginea maritima Bak is commonly called as squill has an ancient and more or less honourable history as medicinal plant. Early physicians use these bulbs and their extracts in treating hydropsy, urine retention, pneumonia (Stoll 1938). In India genus is mainly represented by Urginea indica Kunth (Indian squill or true squill) having similar properties as that of Europian squill. However, recently Europian squill is substituted by Indian squill. Cardiotonic glycosides are the active ingradients and highly appreciated by pharmaceutical industries.

The survey of previous literature shows that there is little work on physiological aspects of genus Urginea. Majority of work deals with taxonomy, chromosome numbers, and phytochemistry. It was therefore thought advisible to undertake cytological and physiological studies in the genus Urginea with special reference to polyploids of U. indica.

Urginea indica Kunth studied in the present investigation have shown wide variety of polyploidy, however in mitosis it has shown various structural configurations in all cytotypes namely 2n=20, 2n=30 and 4n=40 karyotypic analysis of cytotype of U. indica 2n=20 have shown that there are six types of chromosomes and karyotype is assymetrical. In cytotype 2n=30 the mitosis was found highly irregular and there are six types of chromosomes and pattern of karyotype was asymmetrical. Present investigation suggests that it is not true autotriploid but may be allotriploid. It also suggests that study of chromosome banding pattern, hybridization, meiotic studies will unravel this problem. However, at present it is described as cytotype of U. indica. Another cytotype which is studied in present investigation is 4n=40 where mitosis is abnormal and karyotypic pattern is assymetrical. This cytotype shows only 4 types of chromosomes and there is duplication of each set for 4 times indicating that it is autotetraploid, but the relation with other cytotypes of U. indica is not clear, as its karyotypic pattern is quite different than the remaining two cytotypes. It is therefore suggested that thorough examination of cytotypes of U. indica is needed and chromosome banding pattern, meiosis, DNA studied, hybridization will may find out way out of this problem.

Present investigation also documents some anatomical features as it has been suggested that it is a criterion for species classification (Kambale and Ansari 1977).

It is observed that the leaves of cytotype 2n=30 are succulent than other two cytotypes viz. 2n=20 and 4n=40. The mesophyll cells are also showing wide range of variation in cytotype 2n=20 and 2n=30 and 4n=40 too. Morphological differentiation between leaves of 2n=20 and 2n=30 is rather difficult where as leaves of 4n=40 can be readily distinguished from the leaves of other cytotypes.

Chemical nature of soils from various regions (Kolhapur, Goa, Aurangabad) is studied and it is observed that every soil has its separate entity. It is suggested that these differences in mineral status of these soils will have certain reflection on growth of plant, inhabited in that particular soil irrespective of its ploidy level.

Mineral nutrition of cytotypes of U. indica 2n=20, 2n=30 and 4n=40 has been studied with respect to their natural habitat and it is observed that certain elements (Ca^{2+}, N , P^{5+}, Mn^{2+}) uptake is not hampered, either due to soil conditions or due to ploidy level. The role of various elements has been discussed in metabolism of U. indica. under various environmental conditions and at different ploidy level.

Organic constituents of polyploids of U. indica has been studied. The role of T.N is important in osmotic adjustment of U. indica. The trend observed in amount of chlorophylls in polyploids is in agreement

with results obtained by other investigators. It is also concluded from values obtained for carbohydrates that the diploids (2n = 20) are more efficient than tetraploids and cytotype 2n=30. Assimilation of nitrogen indicated that there is no positive correlation between increase in ploidy level and nitrogen content. The values obtained for polyphenols in various cytotypes of U. indica are very low and no significant variation has been obtained in these cytotypes, suggesting that polyphenols are mere reflections of environmental factors. Proline values for all cytotypes are very low suggesting that it has no role as osmotic regulator in U. indica.

From stomatal behaviour of various polyploid plants it is concluded that as ploidy increases the number of stomata decreases, however it is only true for lower epidermis of cytotypes of U. indica. It is concluded from $^{14}CO_2$ study that diploids are more efficient than tetraploids.

In general, it is observed that in course of evolution and also adaptation to various environmental conditions plant or any organism has to gain or loose something and U. indica is the best example for such kind of evolutionary adaptations. It will be interesting to know its genetic status and physiological processes in detail in future course of investigation.