Apomixis in Cenchrus glaucus Mudaliar et Sundaraj

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MS received 18 July 1980; revised 29 December 1981

Abstract. A detailed cytoembryological investigation in Cenchrus glaucus revealed that it is an obligate apomict producing only aposporous embryosacs. Microsporogenesis disclose chromosomal irregularities and megasporogenesis occasionally occur and the development of sexual embryosac is completely absent. On the other hand, aposporous initials develop into 4-nucleate embryosacs. Autonomous development of the embryo is of common occurrence.

Keywords. Cenchrus glaucus; obligate; apospory.

1. Introduction

Cenchrus glaucus Mudaliar et Sundaraj, a pentaploid perennial tropical species belongs to the tribe Paniceae of Panicoideae. The occurrence of apomixis in this genus was first investigated by Fisher et al (1954) in Pennisetum ciliaris and Cenchrus setigerus. Later Snyder et al (1955) outlined a detailed study on the formation of aposporous embryosacs in C. ciliaris, a polymorphic facultative apomict. Preliminary investigation has disclosed that another species of Cenchrus, C. glaucus an aneuploid with 2n = 45, where in microsporogenesis is characterized by abnormalities such as univalents, multivalents and lagging chromosomes, reproduces by gametophytic apomixis. The present study reports the results of cytoembryological studies revealing the formation of only aposporous embryosac (obligate apomict) and the complete absence of sexual embryosac.

2. Material and methods

Clones were collected from Agricultural College, Coimbatore and were grown in the Departmental Botanical Garden, Manasagangotri, University of Mysore, Mysore. Identification of the material was confirmed by the Botanical Survey of India, Coimbatore. A voucher specimen of the material is deposited in the Herbarium, Department of Botany, University of Mysore, Mysore, India.

Florets at appropriate stages of development were collected between 10 a.m. and 1 p.m. and fixed in a mixture of 3 : 1 absolute alcohol and acetic acid, later on stored in 70% alcohol. Pollen mother cells were smeared in 2% acetocarmine for the study of meiosis. For mitotic studies, root tips squashes were made follow-
ing Tijo and Levan's (1950) technique. Embryological studies were carried out following conventional methods of dehydration, infiltration and embedding. Sections were cut at 10-14 microns in thickness and stained in Heidenhain's iron alum haematoxylin.

3. Results

3.1. Microsporogenesis

During diakinesis and metaphase I, tetravalents, univalents in addition to bivalents are formed (figures 1, 5). Chromosome number was confirmed in root-tip (figure 11). Occasionally, a bridge and a fragment configuration indicating structural changes were seen at anaphase I (figure 2). Anaphase distribution is marked by irregularities such as irregular distribution (figure 6), laggards (figure 7) and micronuclei formation at dyad stage (figure 8). Second division irregularities are also pronounced with precocious movement of chromosomes at anaphase (figure 9). Figure 3 reveals a dyad in division stages with 2 micronuclei in one