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GAMETOGENESIS AND FERTILIZATION IN *STRYCHNOS SAMBA* DUVIGN

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In *Strychnos samba* Duvign as the anther matures the cuticle develops small projections and the epidermal cells are impregnated with sphaerocrystals at the stomial groove. 6-7 raidal bands appear in each endothecial cell as the tapetum starts degenerating. A single middle layer persists upto formation of microspore tetrads. The tapetum is of dual orgin. The tapetum towards the inner face arises from the connective and the parietal tapetum arises from the secondary parietal tissue, MMC's undergo synchronous meiotic division. *'in situ'* germination of pollen grains is present and are monosiphonous. The ovule is hemianatropous unitegmic and tenuinucellate. The inner most layer of the integument forms the integumentary tapetum. The megaspore mother cell undergoes first meiotic division give rise to two unequal cells. Micropyle is long with massive integument. The egg and synergids are pyriform. Fertilization is porogamous. Starch accumulates around the primary endosperm nucleus. The division in the fertilized egg is delayed till 2-4 free endosperm nuclei are formed. The endosperm is free nuclear.

Keywords : *'in situ'* germination of pollen; Integumentarty tapetum; Spaerocrystals; *Strychnos samba.*

Introduction

Embryologically the family loganiaceae remained less explored except for a few fragmentary reports. The present work was undertaken to look further into gametogenesis and fertilization aspects in *Strychnos samba* Duvign.

Materials and Methods

The material of *Strychnos samba* Duvign was collected and sent by Prof. A.J. Leewenberg of South Africa for embryological investigation. Customary methods of dehydrastion, embedding in histopathowax and sectioning were followed. The material was sectioned 4-5μ thick for developing microsporangia, 4-6μ for mature anthers, 6-8μ for megagametogenesis, 6-10μ for post fertilization stages. Sections were stained in Ehrillich's haematoxylin and counter stained with light green.

Observations

Microsporangium, Microsporogenesis and Male gametophyte : Young anthers are tetrasporangiate. The outer wall of the epidermis is cutinized. As the anther matures the culticle develops small projects and the epidermal cells are impregnate with spaerocrystals at the stomial groove (Fig.3,4). Endothecium is single layered develops from outer secondary parietal layer (Fig.3).

The endothecial cells are smaller at the stomial groove. These cells develop 6-7 radial bands in each cell as the tapetum starts degenerating. A single middle layer persists upto the formation of microspore tetrads (Fig.1). Tapetum at the inner face arises from the derivative of connective (Fig.2). Whereas the parietal tapetum originates from the secondary parietal tissue. The primary sporogenous cells divide repeatedly to form the microspore mother cells. MMC's undrgo synchronous meiotic divisions. Quadripartition takes places successively forming isobilatral, tetrahedral, T-shaped and decussate type (Fig. 1). Pollen grain is smooth, viable with thick exine and intine. In this *in situ* germination of pollen grains is present and are monosiphonous (Fig. 4).

Megasporangium, Megasporogenesis and Female Gametophyte : A hypodermal archesporial cell is differentiated in the ovular primordium (Fig. 8). The nucellus epidermis degenrates by the time embryosac reaches 8-nucleate stage. The innermost layer of the integument comes in contact with the embryosac becomes glandular and forms the integumentary tapetum (Fig. 6). The ovule is hemianatropous unitegmic and teninucellate (Fig 7).

The archesporial cell directly functions as megaspore mother cell (Fig. 8). The MMC undergoes first meiotic division to give two unequal cells. The 2nd meiotic division in the large micropylar dyad in horizontal while the chalazal undrgoes obligue division (Fig. 5).

Micropyle is long with massive integument. The egg and synergids are pyriform (Fig. 9). The antipodals are more wider than length. Fertilization is porogamous, antipodals degenerate at the time of fertilization(Fig. 10, 11).

Strach accumulates around the primary endosperm nucleus(Fig. 11). Which leads to embryo abortion. The first division of the primary endosperm nucleus is not followed by wall formation (Fig. 12). The division of the primary endosperm nucleus is not followed by wall formation(Fig.12). The division in the fertilized egg is delayed till 2-4 free endosperm nucleri are formed. Repeated free nuclear divisions produced a large number of free nuclei which lie embedded in a peripheral layer of the cytoplasm bearing a central vacuole. The endosperm is free nuclear.

Discussion

The anthers are differentiated with the impregnation of the spaerocrystals at the

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Figs. 1-12. ***Strychnops samba*** **Duvign**

Fig. 1. L. S. of anthers showing epidermis, middle layer and glandular tapetum. The different types of microspore tetrads in the anther locule is T-shaped and decussate types. X1000.

Fig. 2. Portion of anther lobe in T.S. The tapetal cells lying towards the connective are considerably elongated than those of the outer tapetum X 600.

Fig. 3. A cross section of dehisced anthers. Note : Stomium is impregnated with star shaped calcium carbonate crystals. Two pollen grains are united while the other pollen grain is trisiphonous X 270.

Fig. 4. Pollen germination '*in situ*' Note : Various types of germinating pollen grains towards the proximal side of the anther. The endothecium cells are bigger than the distal region X 270.

Fig. 5 Hemianatropus ovule at tetrad formation. Note : The 3rd and 4th megaspores are obliquely placed X 600.

Fig. 6 Syngamy and triple fusion. Completed primary endosperm nucleus surrounded by plenty of starch, zygote is highly enlarged in size X 600.

Fig 7 Primary endosperm nucleus has preceded zygote in division. Endosperm formation is of nuclear type X 600.

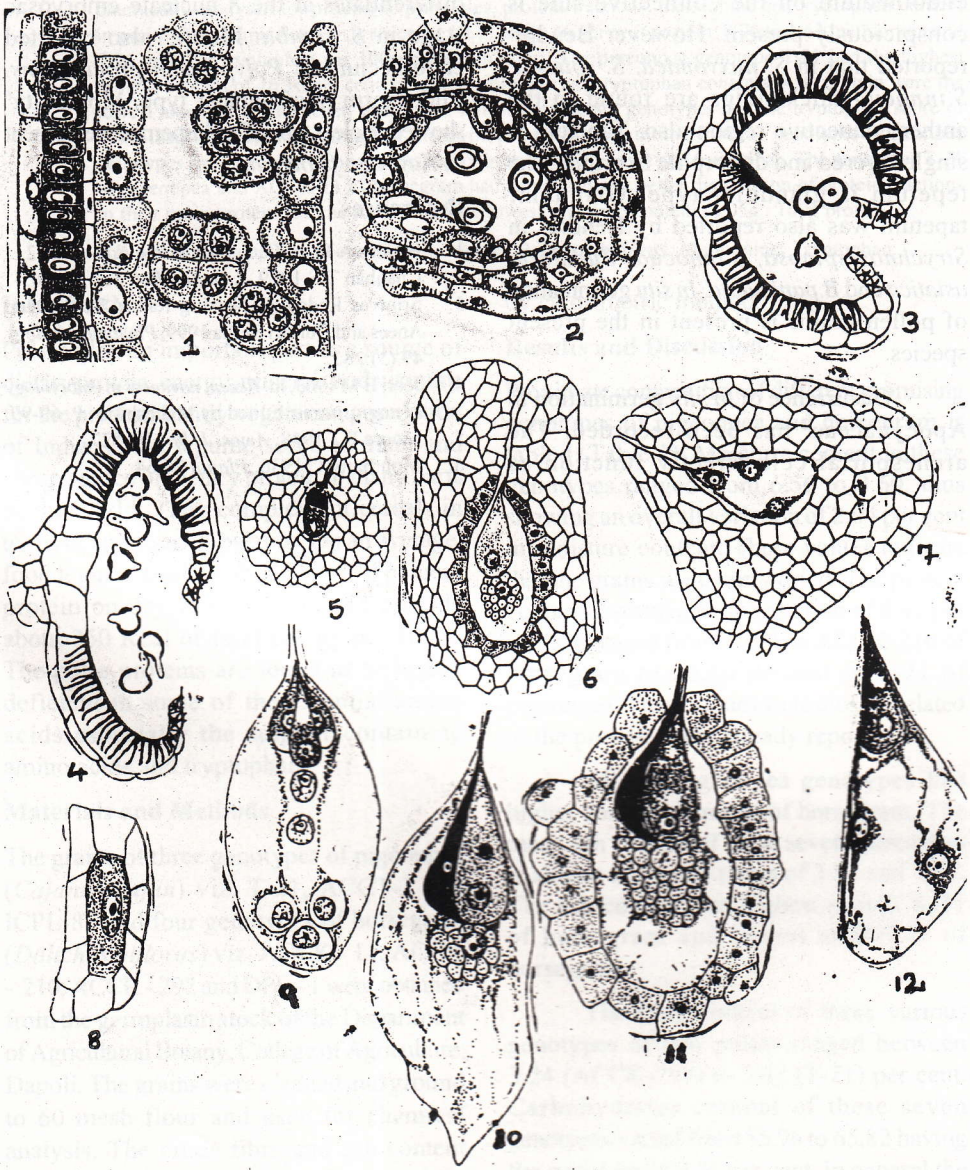
Fig 8 The archesporial cell directly functions as megaspore mother cell X 1000.

Fig 9 Mature embryosac monosporic polygonum type. The egg & synergids shows characteristic vacuolation. Micropylar and chalazal polar nuclei are in the centre of the embryosac, antipodal are large surrounded with cytoplasm X 1000.

Fig 10 Pollen tube discharged its contents, one male gamete in egg cell, while the 2nd male gamete is still inside the pollen tube X 1000.

Fig 11 Syngamy & triple fusion effected. Note : The Pollen tube around the egg cell and starch around the primary endosperm nucleus X 1000.

Fig. 12 Embryosac with zygote and the free nuclear endosperm X 1000.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epidermal and at subepidermal cells of the stomial groove. Stellate crystals occurs in the hypodermal cells of the stomial groove in *Strychnos innocua*[1]. Development of anther wall conforms to the Dicotyledonous type. The fibrous thickenings in the cells of endothecium on the connective side is conspiciously present. However Bendre[1] reported that in *S. nuxvomica, S. spinosa, S.innocua* thickenings are found in the anther connective region also. Tapetum is single layered and dimorphic in origin. The tepetum is glandular type. Glandular tapetum was also reported by Bendre[1] in *Strychnos spinosa, S.innocua, Buddleria asiatica* and *B.paniculata. In situ* germination of pollen grains is present in the present species.

Occurrence of *in situ* germination in Apocynaceae[2] has been recorded. The archesporial cell directly function as megaspore mother cell in *S. samba*. Srinivas Reddy *et al*[3]. also reported in *Mitreola oldenlandioides*. The development of embryo sac is polygonum type. According to Johri[4] polygonum type of embryosac development is the most primitive type. Endothecium differentiates at the 8 nucleate embryosac stage in *S. samba*. Moore[5] also reported endothecium in *Polyprenum procumbens*. Endosperm is of nuclear type. Mohrbatty[6] showed nuclear type of endosperm development in *Fagraea frangrans*.

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