

Hello students, I welcome you all to the program. SYB SC subject botany Semester 3 course code BOC one zero 3 course title, plant Anatomy and Embryology Unit 5 structural organization of Flower Module name development of female gametophyte and I am Dr Suraksha Dongrekar assistant professor at St. Xavier's college, Mapusa Goa. Outline structure of female gametophyte and development of female gametophyte. Learning outcomes defines female gametophyte that is, the embryo SAC explains structure of embryo sac, explains development of the embryo sac that is female gametophyte. Introduction students as we know, gametophyte is the sexual phase in the life cycle of plants. The female gametophyte is also called as embryo SAC. In angiosperms, it mostly develops as a seven celled, 8 nucleated structure. Female gametophyte is developed in the nucellus of the ovule or megasporangium. Now let us see the different steps which are involved in the development of the new embryo into embryo sac. As we know that embryo SAC is present in the nucellus, so nucellus helps in the development of the embryo SAC the primordial nucellus function as Archegonium or we also call it as primary archegonial cells. That means these cells have the ability to reproduce. They are the cells which are very prominent. With a very large size, large dense cytoplasm and a very large nucleus. So now these archegonial cells divide into two different types. The first one is called as the Crassinucellate type of ovule and the second is called as the tenuinucellate type or the pseudo-crassinucellate type of ovule.

In the case of the Crassinucellate type of ovule the cells of the ovule, that is, cells of the nucellus, that is the archegonial cells they divide periclinal or they undergo periclinal division and forms two types of cells. The outer smaller cells as you can see in this picture, they are called as the primary parietal cells and the inner bigger primary cells. They are called as the sporogenous cells. This outer primary parietal cells later on may divide or may not divide and form the parietal tissue, and this parietal tissue later on forms the walls of the embryo SAC, so the cells of these sporogenous cells functions as Megaspore, mother cell and these megaspore mother cell later undergo development to form the embryo SAC. So this megaspore mother cell which is formed here is always diploid in nature, that is, it has two and number of chromosomes. Now the second type is the Tenuinucellate type. Here the cells of the nucellus directly functions as the Megaspore mother cell, so this megaspore mother cell later on develops into the embryo Sac, then the second stage is the Mega sporogenesis, now the diploid megaspore mother cell which is formed will undergo further divisions to produce the megaspores. So the formation of haploid megaspores from diploid megaspore mother cell is known as mega sporogenesis. So here the diploid megaspore mother cell which is formed will undergo 2 reductional division or two meiotic divisions, so it will undergo the first meiotic division, that is meiosis one and will produce two megaspores. Then again it will undergo second meiotic division or meiosis 2, and it will produce 4 haploid megaspores and these four haploid megaspores will then. Undergo the divisions so out of this four megaspores, only one will remain as a functional, and the three will going to degenerate, and usually the megaspores which are facing the chalazal end, which are towards the chalazal end of the ovule day degenerate and the one which is towards the micropyle and will remain as a functional megaspore.

Next step is the megagametogenesis so now. The haploid megaspores formed from this four haploid megaspores only one will remain as a functional and this megaspore now will undergo the next divisions, that is, formation of female gametophyte or embryo SAC from megaspore is known as megagametogenesis. So here the functional megaspore is haploid so it will undergo. 3 consecutive mitotic divisions, so it will undergo mitosis one and produce two nuclei. Here, the division of the nucleus will going to take place. Mitotic division mitosis will going to take place. Nuclei will going to divide. So first

mitosis will take place produces 2 nuclei second mitosis produces 4 nuclei and 3rd mitosis produces 8 nuclei. So altogether 8 nuclei are produced. Now these eight nuclei's will further divide into groups of four and they will start moving toward the two opposite Poles. That is towards the chalazal point and towards the micropyle And now once these four nuclei move towards the opposite pole. Now here one from each Group We'll now migrate and come into the center once the migration of two nuclei in the center is done, then there will be cytokinesis taking place. That is the cell wall formation will going to take place. So 3 nuclei at the micropylar end and three nuclei at the chalazal end. The three nuclei at the micropylar End will develop into egg apparatus, and the three nuclei towards the chalazal end will develop into. Three antipodal cells, now coming to the final structure of the female gametophyte. So when the fully matured embryo SAC is formed, it is always 7 celled 8 nucleated structure. It has two ends. The upper end is called the Chalazal end. The lower end is called as the micropylar end. Now in the center there will be 2 nuclei. They are called as polar nuclei. These two polar nuclei later on fuse to form secondary nucleus. The micropylar end of the central cell is occupied by three cells and these three cells that, together form egg apparatus. Now this apparatus has two synergids and one egg cell. Now next are the cells at the chalazal end. There will be three cells at the chalazal end, and they are called as the antipodal cells at the base of the egg apparatus There will be a finger like projections. As you can see in this particular Picture there are a fingerlike projections present at the egg apparatus. They are called as the filiform apparatus. So this is about the development and the structure of the female gametophyte that is embryo sac. And here are some of the references that you can go through.

Thank you.