

## STUDIES ON PARTHENOGENESIS IN THREE *MARSILEA* SPECIES

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The present paper describes studies of parthenogenesis in three species of *Marsilea* L. (*M. minuta* Linn, *M. rajasthanensis* Gupta and *M. shashibalii* Bhardwaja *et al.*) growing in and around Kota and Ajmer. The present study have shown very low frequency of parthenogenesis. These observations have been taken in tap water at room temperature.

**Keywords:** *Marsilea*; Parthenogenesis.

The phenomenon of parthenogenesis and apogamy in *Marsilea* is of wide occurrence and was first recorded as early as in 1897 by Shaw<sup>1</sup> in *M. drummondii*. Subsequently Nathansohn<sup>2</sup> studied the effect of temperature on the development of embryos parthenogenetically in *M. drummondii*, *M. vestita* and *M. macra*. Strasburger<sup>3</sup> gave an elaborate account of apogamy in *Marsilea* and reported it in a number of species viz. *M. nardu*, *M. drummondii*, *M. vestita*, *M. quadrifolia*, *M. elata* and *M. macra*. Harberlandt<sup>4</sup> reinterpreted the development pattern of parthenogenetic egg cells of *M. drummondii* on the basis of Starsburgers's preparations.

Bhardwaja and Abdullah<sup>5</sup> conducted a series of experiments on some species of *Marsilea* obtained from India, America, Australia, Madagascar. According to these authors parthenogenesis is of wide occurrence in *Marsilea*. These authors have suggested that temperature certainly has some effect on the frequency of parthenogenesis. Loyal and Chopra<sup>6</sup> reported parthenogenesis in *Regnellidium diphyllum*. Sharma<sup>7</sup> studied the effect of physiologically active substances on development of sporelings from isolated megaspores.

Mahlberg and Baldwin<sup>8</sup> conducted experimental studies on megaspore viability, parthenogenesis and sporophyte formation in *Marsilea*, *Pilularia* and *Regnellidium*. Bhardwaja and Sharma<sup>9</sup> have investigated effect of morphactin on megaspore germination. Sporelings developed from unisolated and isolated megaspores (parthenogenetic) of *M. minuta* have been studied for their growth in aseptic cultures containing 2% glucose in addition to basal medium by Wadhvani<sup>10</sup>. Studies of Wadhvani<sup>10</sup> have also substantiated the work of Allsopp<sup>11</sup>. Sen<sup>12</sup>, Soni<sup>13</sup> and Wadhvani<sup>14</sup> discussed apogamy and parthenogenetic development of sporelings in *Marsilea*. Studies of parthenogenesis in *Marsilea* species have been revised by Raja Ram<sup>15</sup>.

Material for observations relating to parthenogenesis of three *Marsilea* species (*M. minuta*, *M. rajasthanensis*, *M. shashibalii*) collected from Botanic Garden, Government College, Ajmer and Borawass village near Kota. Five surface sterilized sporocarps of each species after scarification were placed in petri dishes containing tap water. The megaspores were picked up individually by a soft brush after extrusion of sorophore, washed thoroughly in water and placed in petri dish containing tap water after ascertaining by microscoping examination that no microspore accompany these isolated megaspores. Three replicates were raised for each of above species. A set of control, petridish containing micro and megaspores, was maintained for each set. The experiment was set at room temperature of  $24 \pm 3^\circ\text{C}$  which is generally favorable for spore germination in *Marsilea* species.

Observation on embryo development were recorded after 24 hrs., and sporeling formation after a week of placement of the sporocarps in water. The data are presented in Table 1. It was observed that in *M. minuta* there was much pronounced numerical differentiation between embryo formation in isolated megaspores (7.0) and the control set (35.0). In *M. rajasthanensis* the embryo formation also showed significant difference between the control set (36.0) and the sets of isolated megaspores (6.0). In *M. shashibalii* again, the embryos formed in control and isolated megaspores sets varied much and was found to be 52.0 and 11, respectively.

Observation on sporeling formation in control and isolated megaspores show interspecific variation in *Marsilea*. In *M. minuta* the sporelings percentage was very high (45.6%) in control set as compared to isolated megaspore sets (4.4%). In *M. rajasthanensis* this percentage was 42.0% and 5.0%, respectively in control and isolated megaspore sets. In *M. shashibalii* also 5.0% sporeling developed in the isolated sets while in control

Table 1. Parthenogenesis in the selected species of *Marsilea*.

S No.	Parameters	<i>M. minuta</i>		<i>M. rajasthanensis</i>		<i>M. shashibalii</i>	
		Control	Isolated	Control	Isolated	Control	Isolated
1.	No. of megaspores	57.0	45.0	50.0	40.0	65.0	60.0
2.	No. of Embryos formed	35.0	07.0	36.0	06.0	52.0	11.0
3.	Percentage of Embryos formed	61.4	15.5	72.0	15.0	80.0	18.3
4.	No. of sporeling	26.0	02.0	21.0	02.0	30.0	03.0
5.	Percentage of Sporeling formed	45.6	04.4	42.0	05.0	46.1	05.0

Control = Unisolated Megaspores : Isolated = Megaspores only.

sets well developed sporeling, to the extent of 46.01% of total megaspores, were observed.

The present study has been taken up to evaluate parthenogenesis in three *Marsilea* species. In tap water and at room temperature parthenogenetic embryo formation was 4.4% in *M. minuta*, 5.0% each in *M. rajasthanensis* and *M. shashibalii* have been reported. It is evident from these observations that parthenogenesis (development of sporelings from isolated megaspores) is not so frequent in these species of *Marsilea*.

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