

A STUDY OF RESPONSE TO ANTHHER CULTURE

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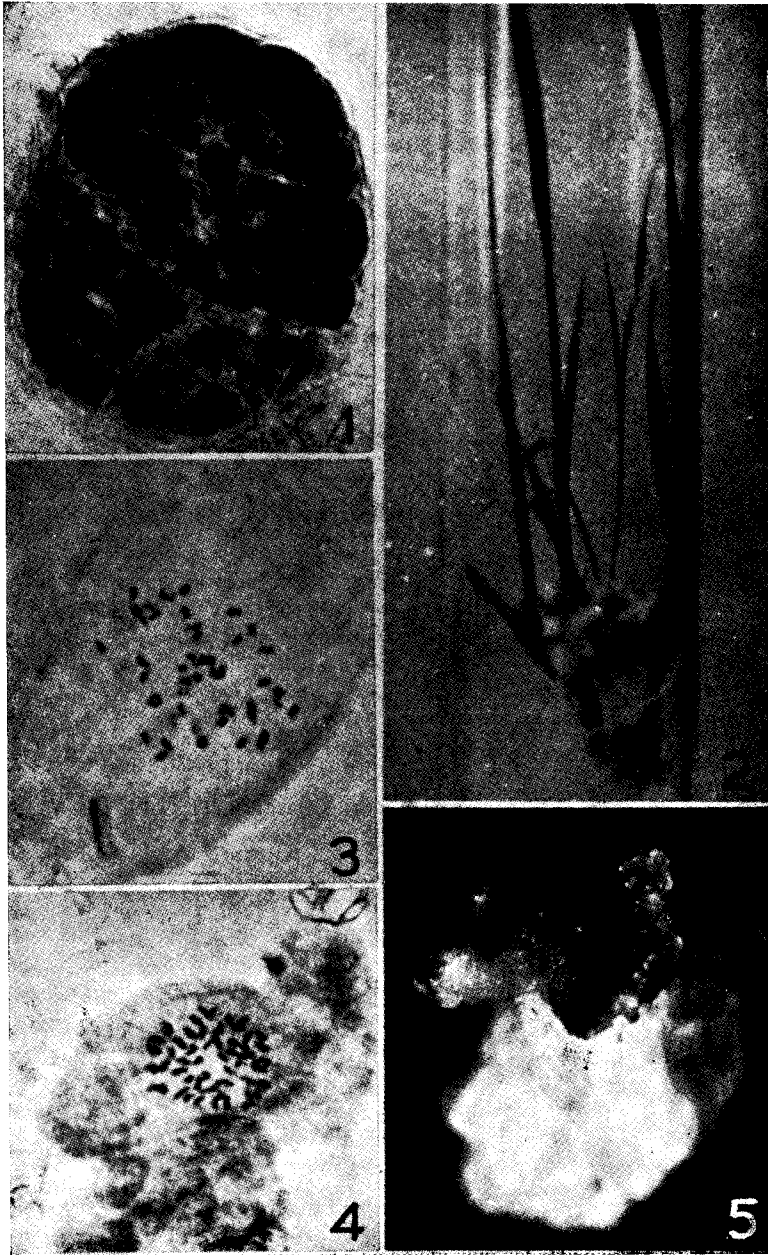
Iyer and Raina (1972) have already presented a detailed analysis of the stages leading to the development of plants of various ploidy from pollen in anther cultures of *Datura metel* and rice. We have extended the study to few other crops and the present paper gives a summary of our observations on these crops with particular reference to the frequency of response to anther culture.

Whereas in *Datura*, the pollen either directly produced a plantlet or underwent callus-formation, in rice, the pollen invariably produced first a pollen embryoid (Fig. 1) and then a callus with the attendant consequences of endoduplication of the haploid complement leading to the differentiation of not only diploid seedlings (Fig. 2) but also triploid (Fig. 3) and tetraploid (Fig. 4) ones. While genotypic differences in the different rice cultivars tried were apparent (Iyer and Raina, 1972; Guha-Mukherjee, 1973), the highest frequency of response to anther culture in terms of the number of anthers producing calli, was in the purple pigmented variety 'Crossa' (15 per cent), the highest so far recorded in rice (Table 1).

Among the other plants which gave pollen-plants in our laboratory brinjal (*Solanum melongena*) proved a success, where also we initially obtained a pollen callus from which subsequently, diploid seedlings differentiated (Raina and Iyer, 1973). This would tend to indicate that members of the family Solanaceae seem to be more responsive to the anther culture technique, *Datura*, *Nicotiana*, *Atropa*, *Lycopersicon* and *Petunia* being the other significantly successful instances recorded in literature.

In Gramineae, besides *Oryza* we had some preliminary success with *Triticum aestivum* var. Max CB-116, which gave a pollen callus and subsequently diploid plants ($2n=42$) on the same basal medium as the one we had used for rice (Blaydes, 1966) with similar adjuvants. Among the Gramineae, barley must be mentioned as the significant instance of success in terms of the practical utilization of the haploids raised through anther culture (Thomas, 1973).

Our chief interest in this field at present is to use the method for producing haploids in tea (*Camellia sinensis*) and some other perennial crops. So far, we have succeeded only in inducing a pollen callus (Fig. 5)



Figs. 1-5. 1. Multicelled pollen of rice var. *Crossa* after 35 days *in vitro*. Note two groups of cells presumably resulting from the vegetative and generative components. 2. Rice seedlings differentiated from pollen callus 4 weeks after subculture on Blaydes medium with 15 per cent coconut milk. 3, 4. Root tip mitosis in pollen plants of rice showing triploid (Fig. 3) and tetraploid (Fig. 4) chromosome constitution. 5. A 5-week old anther culture of tea (*Camellia sinensis* var. *China*) showing pollen callus as well as the massive diploid callus from cut end of filament.

TABLE 1 : Response obtained in different species to anther culture

Species	No. of anthers cultured	Medium	% Response
<i>Datura metel</i>	167	Nitsch's (1969) + 15% CM	56
<i>Oryza sativa</i>			
Sub-species indica		Blaydes' 1966	4
CV Basmati-370	160	+ 2 mg/l	5
CV IARI-5868	145	2, 4-D	3
CV-IARI-5788	136	+1.5 mg/l	15
CV Crossa	103	Kinetin+1.75 mg/l IAA+15% CM	
<i>Solanum melongena</i>	175	Nitsch's (1969) 15% CM	5
var. Gurgaon-1			
<i>Camellia sinensis</i>	607	„	0.3

in the same medium as employed in the case of *Datura metel* and brinjal. The chief drawback in this material as in some others, is the rapid callusing tendency of the diploid connective and filament tissues, which results in the total occlusion of the haploid callus. We have managed to separate the pollen callus in early stages and this is growing in a number of sub-cultures. We have been facing similar difficulty in the rose anther cultures where we are trying to inhibit the development of diploid connective and filament calli by incorporating the amino acid analogue, parafluorophenylalanine, as suggested by Gupta and Carlson (1972). Of the other plants studied in this Laboratory, only diploid connective calli have resulted in jute, *Brassica*, cotton and *Cicer*, whereas no response was elicited in maize and coconut.

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