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Effect of Certain Antibiotics on Pollen Germination and Pollen Tube Growth in *Tecomella undulata* and *Haplophragma adenophyllum*.

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Antibiotics show favourable effect on pollen germination and pollen tube growth in both the plants. Among all the antibiotics tried penicillin proved to the most effective and norfloxacin the least in both the plants.

Key words : Pollen germination, Pollen tube, Antibiotics.

Introduction :

Tecomella undulata and *Haplophragma adenophyllum* are the tree species belonging to the family Bignoniaceae. From ancient times to the present day, there has been an accumulation of information on pollination biology or anthology (Robertson, 1904).Plant lovers have always shown a keen interest in reproductive biology of plants and mechanism of fruiting. Plants with their often elaborate and specialized floral design are ideal for exploring the process of adaptation. Much of the early research in pollination biology was devoted to describing these adaptations and the selective forces presumed to be bring about them. Various environmental factors operate the movement of pollen grains to the stigma. In the present study, the effect of four antibiotics on the pollen germination and pollen tube growth of *Tecomella undulata* and *Haplophragma adenophyllum* was done.

Materials and Methods :

For pollen germination study '*in vitro*' hanging drop technique at room temperature was employed . The pollen grains were kept in a small drop of the culture solution having basal medium and antibiotic solution. For *Tecomella undulata* 20 per cent of sucrose and for *Haplophragma adenophyllum* 15 per cent of sucrose was used as basal medium , which acted as control. This drop was placed on coverslip which was inverted and placed over cavity slide to permit the drop to hang inside the cavity. The slides were examined at several regular intervals during the course of experiment. The pollen tube length and number of pollen grains germinated

at various concentrations, namely, one, two, three and four ppm concentration of different antibiotics *viz*.,penicillin, ampicillin, norfloxacin, amoxycillin were added to the basal media. The data were statistically analysed.

Result and Discussion :

Among all the antibiotics penicillin was most effective and norfloxacin was least in both species.

Effect of Penicillin :

Among all the antibiotics penicillin was most effective and among the different concentrations of penicillin, the results were erratic. Two ppm was found to be most effective where 68.81 per cent germination was recorded, followed by three ppm, one ppm and four ppm concentrations, but only two and three ppm were favourable for pollen germination, rest being ineffective. For tube length also the same trend was observed in case of *T. undulata* . However, in *H. adenophyllum* only two ppm concentration was favourable where 64.65 per cent germination and 212.82 μm of tube length were observed. All other concentrations were inferior to the control.

Effect of Ampicillin :

Only one ppm concentration was superior to the control where 60.63 per cent germination was observed in *H. adenophyllum* and pollen tube length was 201.18 μm at this concentrations . In *T. undulata*, however, all the concentrations were inferior to the control .

Effect of Amoxycillin :

Only two ppm concentration was superior over the control for germination and tube length in *T. undulata*. All the concentrations were found to be inferior to the control in *H. adenophyllum.*

Effect of Norfloxacin :

All the concentrations of norfloxacin were inferior to the control in both the species. Among all the concentrations of norfloxacin four ppm in

H. adenophyllum and three ppm in *T. undulata* were most effective for both the parameters .

The data were statistically analysed and it was observed that in *T. undulata* all concentrations and chemicals and also the interaction between control and different treatments were highly significant for both pollen germination and tube length (Table 1-2). In *H. adenphyllum* for pollen germination highly significant differences were observed in respect of the control and treatments. The results were significant among concentrations but were not significant among different chemicals (Tables 3-4).

Only a few reports by Kimura, Okamota and Hirana (1996), Ma, *et. al.,* (1993) and Sharma (1999) are available on the effect of antibiotics on pollen germination and tube growth.

It was observed that both promotory and inhibitory effects were shown by penicillin and ampicillin. Norfloxacin and amoxycillin were inhibitory for both pollen germination and tube length in *H. adenophyllum*. Ma *et al.* (1993) observed that penicillin promoted pollen germination in apple, cherry, apricot plum and *Pyrus bretschneideri* but paclobutrazol inhibited pollen germination and pollen tube growth in all species. Sharma (1999) observed in *Dianthus barbatus* that streptomycin decrease pollen tube length and pollen germination. Kimura *et. al.,* (1996) tried streptomycin on grapes cv. Muscat bailey pollen germination and pollen tube growth were not affected when clusters were treated with streptomycin.

In the present study the effectiveness of ampicillin, norfloxacin, amoxycillin and penicillin was penicillin > ampicillin > norfloxacin > amoxycillin in *H. adenophyllum* while in *T. undulata* it was penicillin > amoxycillin > ampicillin > norfloxacin.

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Table 1 : Effect of certain antibiotics on pollen germination (percent) in *Tecomella undulata*

	Control	**1 ppm**	**2 ppm**	**3 ppm**	**4 ppm**
Ampicillin	65.23	42.16	30.18	22.16	18.75
Norfloxacin	65.23	20.18	28.78	24.62	22.75
Amoxollin	65.23	40.18	60.16	27.16	21.18
Penicillin	65.23	48.71	68.18	61.78	25.76

Source of variation	**D.F.**	**S.S.**	**M.S.S.**	**F.**	**5%**
Replication	**2**	**6.99**	**3.49**	**0.286^{NS}**	**3.15**
Control *VS* Treatment	1	8603.67	8603.67	31.54**	4.00
Among concentrations	4	12227.99	3056.99	11.20***	2.37
Among Chemicals	3	4263.25	1421.08	5.21***	2.76
Interaction	2	4079.31	2039.65	7.47***	3.15
Error	47	12817.42	272.71	-	-

NS – Not Significant
* – Significant
**** – Highly Significant**
***** – Very Highly Significant**

Table 2 : Effect of certain antibiotics on pollen tube length (µm) in *Tecomella undulata*

	Control	**1 ppm**	**2 ppm**	**3 ppm**	**4 ppm**
Ampicillin	158.71	119.12	98.65	82.18	66.44
Norfloxacin	158.71	22.16	38.22	25.28	20.18
Amoxollin	158.71	105.62	220.16	108.12	87.65
Penicillin	158.71	108.16	248.16	162.65	101.52

Source of variation	**D.F.**	**S.S.**	**M.S.S.**	**F.**	**5%**
Replication	**2**	**193.11**	**96.55**	**0.26^{NS}**	**3.15**
Control *VS* Treatment	1	26134.03	26134.03	72.51***	4.00
Among concentrations	4	43071.49	10767.87	29.88***	2.37
Among Chemicals	3	91580.45	30526.81	84.70***	2.76
Interaction	2	58937.64	29468.82	81.77***	3.15
Error	47	16937.46	360.37	-	-

NS – Not Significant
* – Significant
**** – Highly Significant**
*** – Very Highly Significant

Table 3 : Effect of certain antibiotics on pollen germination (percent) in *Haplophragma adenophyllum*

	Control	**1 ppm**	**2 ppm**	**3 ppm**	**4 ppm**
Ampicillin	54.68	60.63	53.65	32.15	30.18
Norfloxacin	54.68	12.62	22.13	48.16	25.18
Amoxollin	54.68	10.11	20.12	28.65	32.17
Penicillin	54.68	50.18	64.65	45.18	28.75

Source of variation	**D.F.**	**S.S.**	**M.S.S.**	**F.**	**5%**
Replication	2	90.47	42.23	0.579^{NS}	3.15
Control *VS* Treatment	1	3573.81	3573.81	45.75***	4.00
Among concentrations	4	898.74	224.68	2.87*	2.37
Among Chemicals	3	623.59	207.86	2.66^{NS}	2.76
Interaction	2	7118.56	3559.28	45.57***	3.15
Error	47	3674.85	78.1	-	-

NS – Not Significant
* – Significant
**** – Highly Significant**
***** – Very Highly Significant**

Table 4 : Effect of certain antibiotics on pollen tube length (µm) in *Haplophragma adenophyllum*

	Control	**1 ppm**	**2 ppm**	**3 ppm**	**4 ppm**
Ampicillin	197.56	201.18	178.16	121.1	85.12
Norfloxacin	197.56	22.12	32.14	90.36	45.18
Amoxollin	197.56	20.18	28.22	39.5	50.79
Penicillin	197.56	140.18	212.82	82.14	78.62

Source of variation	**D.F.**	**S.S.**	**M.S.S.**	**F.**	**5%**
Replication	**2**	**20.83**	**10.41**	**0.008^{NS}**	**3.15**
Control *VS* Treatment	1	112643.26	112643.26	88.79***	4.00
Among concentrations	4	14737.29	3684.32	2.90^{NS}	2.37
Among Chemicals	3	1033.94	344.64	0.0271^{NS}	2.76
Interaction	2	114384.49	57192.24	45.08**	3.15
Error	47	59622.54	1268.56	-	-

NS – Not Significant
* – Significant
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***** – Very Highly Significant**

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