73. On the Germination of Pollen Obtained from Mosaic Tobacco Plants.¹⁾

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Kostoff²⁾ reported the female sterility of tobacco plants affected by a certain mosaic virus and also the abnormality in the function of the germination of pollen. In his case, the occurrence of the abundant abortive pollen resulted in the low percentage of germination.

The writer carried out the germination experiments with the pollen of the healthy and mosaic tobacco plants (*Nicotiana tabacum*, Hatano variety), which had been grown in the green house. One series of the seedlings were inoculated with the expressed juice of mosaic tobacco leaves by means of rubbing method, and both series of plants, healthy and diseased, were grown in pots until blooming under the same conditions. Agar medium containing 5 per cent glucose was poured into sterilized Petri-dishes, and after it became cool, pollen was sown on it. The dishes were incubated in a thermostat at about 25°C for 6 hours, and then a few drops of formalin were added on the inner side of the lids of the dishes, and the dishes were covered with them to prevent the further development of the germ tubes of the pollen. A bit of the agar sheet on which pollen was sown was cut off and laid on a slide glass, and pollen was stained with cotton-blue solution (1%) and examined under the microscope.

The results of the experiments are shown in the following Tables.

TABLE I. Germination of Pollen Taken from Healthy Plants.

No. of Exp.	Number of Pollen Observed	Abortive Pollen		Apparently Normal Pollen					
		Number	%	Number	%	Germinated		Not Germinated	
						Number	%	Number	%
I	1014	55	5.42	959	94.58	705	73.51	254	26.49
II	1000	111	11.10	889	88.90	493	55.46	396	44.54
III	1000	165	16.50	835	83.50	227	27.19	608	72.81
IV	1021	192	18.05	829	81.20	502	60.56	327	39.45
V	1000	77	7.70	923	92.30	411	44.53	512	55.47
VI	1000	126	12.60	874	87.40	377	43.14	497	56.86
VII	1000	123	12.30	877	87.70	382	43.56	495	56.44
VIII	1000	110	11.00	890	89.00	525	58.99	365	41.01
IX	1000	117	11.70	883	88.30	510	57.76	373	42.24
X	1000	95	9.50	905	90.50	540	59.67	365	40.33
Average			11.59		88.34		52.44		47.56

1) The present investigation was done in the Tokugawa Institute for Biological Research.

2) Kostoff, D.: *Genetica*, **15** (1933), 103-114.

TABLE II. Germination of Pollen Taken from Diseased Plants.

No. of Exp.	Number of Pollen Observed	Abortive Pollen		Apparently Normal Pollen					
		Number	%	Number	%	Germinated		Not Germinated	
						Number	%	Number	%
I	1000	33	3.30	967	96.70	803	83.04	164	16.96
II	1000	89	8.90	911	91.10	728	79.91	183	20.09
III	1000	58	5.80	942	94.20	773	82.06	169	17.94
IV	1000	56	5.60	944	94.40	761	80.61	183	19.39
V	1000	119	11.90	881	88.10	820	93.08	61	6.92
VI	1000	113	11.30	887	88.70	732	82.53	155	17.47
VII	1000	214	21.40	786	78.60	76	9.67	710	90.33
VIII	1000	80	8.00	920	92.00	413	44.89	507	55.11
IX	1000	178	17.80	822	82.20	422	51.34	400	48.66
X	1000	155	15.50	845	84.50	399	47.22	446	52.78
XI	1047	102	9.74	945	90.26	495	52.38	450	47.62
XII	1016	141	13.88	875	86.12	515	58.86	360	41.14
Average			11.09		88.91		63.80		36.20

Some sterile pollen was observed in both series of healthy and diseased plants. They were empty in their contents and the walls shrivelled. The average percentage of such abortive pollen taken from healthy and diseased plants is similar to each other (11.59% and 11.09% respectively), and the writer has not experienced in any case such a large amount of abortive pollen as reported by Kostoff, who had observed 48-50 per cent sterile pollen. Neither was abnormally large pollen abundant. Comparing the degree of the germination of apparently normal pollen between healthy and diseased plants, the average percentage of the germinated pollen is rather high in the diseased plants than in the healthy ones, though an exceptionally lower percentage of germinated pollen is observed in the case of No. VII in diseased series.

The writer and his colaborator¹⁾ observed the occurrence of 'X-Body' or 'Cell Inclusion' in the pollen of mosaic plants, and furthermore the writer experienced positive case in the results of inoculation experiment using the pollen as an inoculum which obtained from diseased plants. Allard²⁾ has also proved the presence of virus in the anthers of diseased tobacco and from these facts we may assume the presence of the infective principle in the pollen. However, from the results of the present investigation we may conclude that the formation of abortive pollen is the results of the specificity or special properties of this variety used in the test,³⁾ but not the results of the effects of the virus, and that the function of the pollen, and especially in this case, its germination ability is also never badly influenced by the virus which causes the mosaic disease of tobacco plants.

1) Hirayama, S. and Yuasa, A.: *Ann. Phytopath. Soc. Japan*, **5** (1935), 197-205.

2) Allard, H. A.: *Journ. Agr. Res.*, **5** (1915), 251-255.

3) A cytological study on this line will be recently reported in another paper.