



Title	稲馬鹿苗病菌の病原性の變化に就て
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CHANGE OF PATHOGENICITY
SHOWN BY THE "BAKANAE" FUNGUS,
GIBBERELLA FUJIKUROI

BY

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The "*Bakanae*" disease of rice plant is caused by a fungous parasite, *Gibberella Fujikuroi*, and characterized by the taller and more slender appearance in shoots than that of normal plants. During the writer's research on this disease, a change of pathogenicity was observed in one strain of the causal fungus, probably resulting from continued cultivation on artificial media, and the matter reported in this paper is related to this problem.

The fungus used was kindly furnished by Mr. J. KIMURA, who had isolated it from a diseased seedling collected at Kotoni near Sapporo in 1928. The fungus which originated from a single spore was cultured continuously on onion decoction agar. The inoculation experiments upon rice plants were started in March, 1929 and repeated several times with successful infection until September, 1931. Since December, 1931, however, the fungus has never caused either overgrowth symptom or slender appearance upon the inoculated plants. The filtrate of the fungus in question also caused no overgrowth of the aerial parts of rice seedlings. The experimental results obtained are shown in Table 1. The rice seeds used throughout the experiments were those of a pure line of the variety "*Bozu*". The experimental methods denoted 1, 2 and 3 respectively in the Table are as follows:

1. The inoculated seeds were planted in sand moistened with KNOP's solution in PETRI dishes.
2. The seedlings were placed in KNOP's solution to which was added the fungous filtrate.
3. In this case, the experiment was conducted in a similar manner as in Experiment No. 2, detailed in the writer's previous paper (2), using alcohol as the solvent.

TABLE I. Showing the effect of the "*Bakanae*" fungus upon the rice seedlings at different periods of time during its culture

	Date of experiments	Methods	Number of plants tested	Length of shoots (cm.)		
				Aver.	Max.	Min.
Control Inoculated	March, 15-April, 15, 1929	I	9	14.54	17.0	11.5
			8	24.53	27.5	22.0
Control Inoculated	April, 7-May, 1, 1929	I	18	18.47	22.0	12.0
			15	27.11	33.0	21.6
Control Filtrate	October, 6-13, 1929	2	4	9.15	10.7	7.7
			6	15.55	19.0	12.0
Control Filtrate	March, 20-26, 1930	2	11	12.4	14.2	9.5
			9	14.47	18.0	10.0
KNOP's sol. Extract	February, 13-19, 1931	3	9	14.09	16.0	11.5
			6	15.38	17.3	12.0
KNOP's sol. Extract	April, 4-11, 1931	3	9	12.73	15.4	11.0
			6	16.37	18.0	13.9
KNOP's sol. Filtrate	September, 1-8, 1931	2	6	13.16	14.8	10.8
			6	16.0	19.2	11.7
KNOP's sol. Filtrate	December, 13-18, 1931	2	6	23.12	26.5	21.3
			6	15.02	18.7	11.2
Control Extract	June, 4-14, 1932	3	6	11.07	11.5	10.0
			6	11.4	12.4	10.5
KNOP's sol. Extract	August, 26-Sept. 1, 1932	3	6	13.53	17.7	10.8
			6	14.07	20.4	11.5
Control Inoculated	Sept. 13-Oct. 10, 1932	I	9	20.0	26.2	14.5
			10	20.2	24.0	16.6

Looking over the results of the experiments, it will be found that the fungus was capable of causing the overgrowth of rice plant during a period until September, 1931, whatever the experimental method employed might be. Since December, 1931, however, the fungus ceased to cause any overgrowth symptom upon rice seedlings. Although in the latter case some of the inoculated seedlings were recorded to be a little taller than control plants, the slender appearance was by no means noticeable.

It is generally recognized that a pathogene, which cultured continuously for a long time on artificial media, more or less loses its pathogenicity. The "*Bakanae*" fungus is characterized by its special nature, the excretion of a growth promoting substance which eventually causes the overgrowth symptom. If the apparent change of pathogenicity of the fungus is due to a gradual weakening of its power of infection or declining of virulence by continued cultivation, the fungous filtrate may possibly contain a certain amount of the growth promoting substance sufficient to cause those symptoms. But such was not the actual case of the writer's experiments, neither the pathogene nor the filtrate under consideration having produced any overgrowth symptom upon rice seedlings. It occurs to the writer now to think it possible that the pathogene has lost its power of excreting the growth promoting substance during the three years of cultivation. If this should be true, it follows that the fungus in question has suffered a certain change in its metabolism with respect to its function of producing the growth promoting substance, on account of its prolonged cultivation on artificial media, which are remarkably different from its natural substrata.

Allowing the four-year or five-year old fungus in question to grow upon its host plant for a month showed no effect in the restoration of the declined virulence.

The above results appear to offer some hints as to the relation between the host and the metabolic products of its pathogene.

In conclusion, the writer wishes to express his sincere thanks to Prof. S. ITO for his kind direction and criticisms. He also expresses his heartiest thanks to Profs. Y. TOCHINAI and T. FUKUSHI for their kind advices.

Literature Cited

1. ITO, S. and SHIMADA, S.: On the nature of the growth promoting substance excreted by the "*Bakanae*" fungus. Ann. Phytopath. Soc. Japan, 2, pp. 322-338, 1931.
2. SHIMADA, S.: Further studies on the nature of the growth promoting substance excreted by the "*Bakanae*" fungus. Ann. Phytopath. Soc. Japan, 2, pp. 442-453, 1932.

摘 要

稻馬鹿苗病菌の病原性の變化に就て

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稻馬鹿苗病に關し研究中、此病原菌が長年月の培養の結果その病原性に變化を來し、稻苗に對し徒長現象を起さしむる能力を失ふに到る事實を認めたり。而して之と殆んど同時に、該菌の培養濾液中には生長促進物の存在を認め難きに到れり。之該菌が長年月間天然状態と全く異なる榮養状態に培養せられし結果、其の物質代謝、特に生長促進物の分泌能に變化を來せしものと考察せらる。