Annouucement

JARQ has been reporting the highlight of research results and practical experiences obtained in Japan with an objective of disseminating up-to-date information on what are going on and what have been done in agricultural research in Japan to our overseas friends. Articles which have appeared in JARQ were almost exclusively related to Japanese agriculture, covering crop production, animal production, agricultural engineering and machineries and food technology.

From this issue onwards, however, JARQ will contain a special section for tropical agriculture, in which research findings obtained by the Tropical Agriculture Research Center in cooperation with research organizations abroad will be presented in the form of quick report of the Center.

It is hoped that this section will increase the usefulness of JARQ for our overseas friends.

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Noboru Yamada
Chairman
Editorial Board

Strain of *Xanthomonas oryzae* and its bacteriophage in Thailand

An attempt has been made in this experiment to identify strains of *X. oryzae* and its bacteriophage in Thailand in comparison with Japanese ones. Samples of the bacterial leaf blight of rice were collected from every part of the country in 1972 and 1973.

Isolation of the causal organism was made by the standard isolation method for bacterial leaf blight of rice with potato peptone sucrose agar.

Isolation of the bacteriophage was done by cutting diseased leaves into small pieces, shaking them for a few minutes with sterile water, and plating a part of the water with culture media and bacteria isolated from the same leaf. Appearance of phage plaques within 12 to 15 hours on the plate indicates the presence of the bacteriophage. Bacteriophage was stocked in vitamin free casein hydrolysate solution.

Bacteriophage strain were examined by streak method using a mixture of 2 ml of bacterial suspension and 5 ml of melted potato peptone sucrose agar. Bacteriophage solution was streaked on to the plate surface using a sterilized loop, and incubated at 30°C for about 15 hours. Appearance of the clear zones indicates the sensitivity of the bacterium to that particular bacteriophage.

Result is shown in Table 1. Bacteriophage of *Xanthomonas oryzae* in Thai is classified into five types and isolates of *X. oryzae* fall into eleven groups (A,B,C,D,E,F,G,H,I,J and K) concerning with their relative sensitivities to the five bacteriophage strains. Since proper naming should be based not only on morphology and serology but also on characteristics compared with phages in other countries, tentative names were given to five types of Thai bacteriophage as TBP_1, TBP_2, TBP_3, TBP_4, and TBP_5.

Bacterial strain B and C are the most dominant ones distributed all over the country. Strain A, the most sensitive one against all kinds of Thai bacteriophage which is useful for the forecasting of this disease in Thailand, was found in Southern Thailand.

Table 1. Strains of bacteriophage and *Xanthomonas oryzae* in Thailand

Bacterial strain		Thai phage					Japanese phage				Nos. of isolates
		TBP_1	TBP_2	TBP_3	TBP_4	TBP_5	OP_1	OP_1h	OP_1h_2	OP_2	
Thai	A	+	+	+	+	+	+	−	+	+	2
	B	+	+	+	+	−	−	+	+	+	30
	C	+	+	+	−	+	−	−	+	+	35
	D	+	+	−	+	−	−	+	+	+	3
	E	+	+	−	−	+	−	−	+	+	7
	F	+	−	+	+	−	−	−	+	+	3
	G	+	−	+	−	−	−	+	−	+	2
	H	+	−	−	+	−	−	−	−	−	9
	I	−	−	+	−	−	−	−	−	+	19
	J	−	−	−	+	−	−	−	+	−	4
	K	−	−	−	−	−	−	−	−	−	11
Japanese	A	−	−	−	−	−	+	−	+	+	
	B	+	+	+	+	−	−	+	+	+	
	C	−	−	−	−	−	−	−	−	−	
	D	−	−	−	−	−	−	−	+	+	
	E	−	−	−	−	−	−	−	−	+	

Thai bacteriophages were distinctly different from those of Japanese ones. But Thai strain B and Japanese strain B of *X. oryzae* showed similar sensitivities against all kind of Thai and Japanese bacteriophages. Therefore, it is clear that Thai strain B and Japanese strain B of *X. oryzae* belong to the same group with respect to bacteriophage reaction. This is an interesting discovery of the common phage reaction of *X. oryzae* strain among different countries.

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Infction source of the bacterial leaf blight of rice in Thailand

In Thailand, rice plants can be grown almost all year round and in some places stubbles remain alive in fields even in the off season. This phenomenon is considered to be most favorable for the survival of the causal organism from season to season. Present study was made to know the seasonal occurrence of leaf blight bacteria in irrigation water during the off season in 1973 and 1974 at Bangkhen Rice Experiment Station, Thailand. The detection of bacteria in water was made by means of the bacteriophage method. The phage method is designed to grasp indirectly the tendency of bacterial population by determining the number of phages which increase with the multiplication of bacteria.

Counting method of bacteriophage population in test water was as follows; 1 ml of irrigation water collected was mixed with 1 ml of the bacterial suspension and 5 ml of melted potato peptone sucrose agar medium at 43–45°C. Resultant mixture in Petri

dish was incubated at 20°C for about 15 hours. Phage plaques appeared on the plate indicate the bacteriophage population in every 1 ml of the test water. Bacterial strain B, dominant one in field of this station, was used as test bacteria.

Result is shown in Tables 1 and 2. Primary infection of the bacterial leaf blight of rice in Thailand is caused by the bacteria from rice stubbles which were infected with the disease during the last season. Bacteriophage in the paddy field water appear after plowing and harrowing with water, and hold their population for about two weeks prior to seed sowing or transplanting of rice seedling. It is presumed that such a sudden

Table 1. Phage population in nursery and paddy water before transplanting
Off season, 1973 (per 1 ml water)

Sampling point	Date of sampling								
	8/1	15/1	22/1	29/1	5/2	13/2	20/2	26/2	5/3
Main channel	66	6	0	0	1	0	1	0	0
Drain channel	5	1	0	1	1	0	0	0	0
Nursery		332*	432*	0	0	0	0	0	0
Paddy a					0*	0*	0*	0	3
b					1*	2*	0*	0*	0
c						0*	98*	0*	3
d						30*	6*	0*	123
e						0*	3*	0	0

* Plowing and harrowing with water

Table 2. Phage population in nursery and paddy water before transplanting
Off season, 1974 (per 1 ml water)

Sampling point	Date of sampling												
	24/12	2/1	7/1	14/1	21/1	28/1	4/2	11/2	18/2	25/2	4/3	11/3	18/3
Main channel	0	8	1	0	0	0	0	0	0	0	0	0	0
Drain channel	0	3	0	0	0	0	0	0	0	0	0	0	0
Nursery A	42*	8*	1*	0*	0	0	0	0	0	0	0		
B					2*	7*	0*	0	0	0	0	0	0
C											0*	0*	0*
Paddy a						3*	40*	0					
b						0*	7*	0					
c						0*	0*	0					
d						0*	0*	0*	0				
e								0*	0				
f								0*	0*	0*	0		
g								0*	0*	0			
h								0*	0				
i									0*	0			
j									0*	0*	0*	0*	0
k										0*	9*	0*	0
l										0*	0*	0*	0
m												0*	0*

* Plowing and harrowing with water

increase of bacteriophage in the paddy field water is due to the bacteria which were reactivated and liberated from rice stubbles by plowing and harrowing under wet condition. In general, free bacteria in irrigation water die within 24 hours. But phage population in this study remains high for about two weeks. It is suggested that bacteria are released every day from rice stubbles until all of them aer reactivated and liberated into paddy water.

Irrigation from paddy field to paddy field is usually practiced in Thailand, and the water irrigated paddy fields is used for nurseries. If a nursery is located lower than paddy fields, the nursery is apt to be suffered from the infection of the bacterial leaf blight. Therefore, attention should be paid to water management, so that irrigation water is introduced to nurseries directly from main channel. Deep submergence on nurseries should be avoided, because it often induces "Kresek" after transplanting.

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