

PRELIMINARY EXPERIMENTS ON THE LABORATORY
EVALUATION OF SOME ANTIBIOTICS AGAINST
BACTERIAL LEAF BLIGHT DISEASE OF PADDY
CAUSED BY *XANTHOMONAS ORYZAE*
(Uyeda and Ishiyama) Dowson

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The efficacy of Streptocycline and Agrimycin against bacterial leaf blight disease of paddy, caused by *Xanthomonas oryzae* (Uyeda and Ishiyama) Dowson, was compared *in vitro*. Recommended dose of Agrimycin (15 gm/112 litres water) almost completely checked the bacterial multiplication where as standad dose of Streptocycline (3 gm/112 litres water) could not check the bacterial growth to the same extent when diseased leaves were treated for 90 minutes in the said antibiotic solutions. It was found that higher dose of Agrimycin (20 gm/112 litres water) completely checked the bacterial growth while Streptocycline at a higher dose of (4 gms/112 litres) water could not totally check the bacterial multiplication.

INTRODUCTION

Taichung Native—1, a Formosan variety of rice is highly susceptible to bacterial leaf blight disease, caused by *Xanthomonas oryzae* (Uyeda and Ishiyama) Dowson. To combat this disease, Streptocycline, an antibiotic was recommended by All India Co-ordinated Rice Improvement Project (1966). Srivastava and Rao (1964) suggested the use of a mixture of 0.025% Argimycin and 0.05% wet Ceresan for 12 hours seed treatment followed by hot water treatment for controlling the disease.

In order to compare the efficacy of Streptocycline and Agrimycin in controlling the said disease of paddy, two laboratory tests were performed. Firstly, the infected leaves were soaked in the antibiotic solutions for different periods and secondly, the organism was grown in liquid media containing either different concentrations of Agrimycin and Streptocycline. The results of these tests have been presented and discussed in the present paper.

MATERIALS AND METHODS

Soaking of infected leaves in the antibiotic solutions: This experiment was done by following excised leaf technique. Infected paddy leaves were collected and cut into pieces (each of 15 cm. length). The cut ends of such leaves were sealed by means of paraffin to prevent the oozing out of the bacteria from such ends when placed in chemically soaked sterilized blotting papers. Streptocycline (3 gms/112 litres water) and Agrimycin (15 gms/112 litres water) were used for the tests. The leaf bits were placed in between the two thoroughly soaked blotting papers for 20 minutes, 30 minutes, 60 minutes and 90 minutes. After the treatment, leaf bits were thoroughly washed with sterile water, and the viability of bacteria within the host was ascertained by culturing the bacteria from treated leaves.

Effect of different concentrations of antibiotics on bacterial population: In this experiment bacteria from infected leaves were grown in nutrient broth containing different concentrations of either Agrimycin or Streptocycline for 24 and 48 hours at 22°C and in diffused light. Three concentrations including one higher and one lower than the recommended dose for each antibiotic were used. In case of Streptocycline concentrations of 2 gms., 3 gms., 4 gms. ; and 10 gms., 15 gms. and 20 gms. in case of Agrimycin were taken and which were dissolved in 112 litres of water. The effects of different concentrations of these antibiotics on bacterial growth were assessed on the intensity of turbidity of the broth due to bacterial growth. Subsequently checked by culturing the bacteria on nutrient agar tubes from such cultured broth. The results are given in Table 1 and 2.

RESULTS

Table 1. Showing the viability of bacteria within host tissues after treatment with antibiotics.

Chemical and dosage	Period of treatment (in minutes)	Growth of bacteria (24 hrs.)
<i>Streptocycline</i>		
3 gms/112 litres water	20	+++
	30	++
	60	+
	90	+
<i>Agrimycin</i>		
15 gms/112 litres water	20	++
	30	++
	60	+
	90	0
Control	—	++++

0=Nil. +=Very feeble growth. ++=Feeble growth.
 +++=Moderate growth. ++++=Heavy growth.

Table 2. Viability of bacteria grown in the liquid media with different concentrations of antibiotics.

Chemical and dosage	Growth of bacteria after treatment	
	24 hrs.	48 hrs.
<i>Streptocycline</i>		
2 gms/112 litres water	+++	+++
3 gms/112 litres water	++	++
4 gms/112 litres water	+	+
<i>Agrimycin</i>		
10 gms/112 litres water	++	++
15 gms/112 litres water	+	+
20 gms/112 litres water	0	0
Control	++++	++++

0=Nil. +=Very feeble growth. ++=Feeble growth
 +++=Moderate growth. ++++=Heavy growth.

The Table 1 shows that the growth of bacteria was completely inhibited when the leaf bits were treated for 90 minutes in Agrimycin solution. Streptocycline on the other hand could not check the growth of bacteria completely even after 90 minutes treatment.

Table 2 shows that Agrimycin at the concentration of 20 gms/112 litres water gave complete check on the multiplication of bacteria whereas Streptocycline at higher concentration of 4 gms/112 litres water could not check completely.

DISCUSSIONS

Preliminary laboratory experiments that have been carried out on the comparative efficacy of Streptocycline and Agrimycin demonstrate that when the infected leaves were soaked in the solution of Agrimycin at a concentration of 15 gms/112 litres water for 90 minutes, no bacteria could be isolated from such leaves, this may possibly be due to killing of bacterial population within the host tissue. Whereas during the same period of treatment in Streptocycline, feeble growth of bacteria could be obtained on isolation, indicating thereby the inhibiting action of Streptocycline on the bacterial multiplication.

It was found that Agrimycin at a concentration of 15 gms/112 litres water considerably weakened the bacterial growth when grown for 24 and 48 hours, but at a higher dose of 20 gms/112 litres water completely inhibited the bacterial growth. Streptocycline on the other hand, gave no satisfactory check on bacterial growth when recommended dose was given. But higher concentration of streptocycline (4 gm/112 litres water) considerably reduced the growth but did not give complete check. This shows that Agrimycin can give better check on the bacterial multiplication than Streptocycline.

REFERENCES

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(Accepted for publication 20th September 1968)