

## SCREENING OF CABBAGE VARIETIES FOR RESISTANCE TO BACTERIAL BLIGHT DISEASE

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### RINGKASAN

Tidak terdapat perbezaan antara varieti mengenai masa kemunculan simptom. Kedudukan dedaun berkaitrapat dengan masa kemunculan simptom-simptom. Dedaun pada lengkaran kedua (iaitu dari bawah) memperlihatkan simptom-simptom dengan cepat pada hari kelima dan keenam selepas penyuntikan. Varieti Autumn Queen dan Eiyu didapati sederhana peka. Walau bagaimanapun varieti Eiyu adalah lebih baik.

### INTRODUCTION

The bacterial blight disease of cabbage (*Brassica oleracea* var. *capitata* L.) caused by *Xanthomonas campestris* pv. *campestris* (Pammel) Dowson (CHOUDHURY, 1967; KNOTT and DEANON, 1967; HO, 1985) is a very common and serious disease in cabbage farms (HO, HABSAH and NOORSHINAH, 1984). The disease normally appears at about one month after transplanting, first attacking the lower leaves. The disease spreads from the lower leaves upwards killing the heavily infected leaves while progressing towards younger leaves. In seriously infected plants, head formation is adversely affected resulting in small or no head at all. The disease often appears on mature leaves in the form of greyish-green water-soaked lesions initially, maturing to brown lesions which coalesce to give a blighted appearance on the entire leaf with prominent black veins.

The experiment was carried out to evaluate varietal resistance to this disease and the susceptibility of the different whorls of leaves to it.

### MATERIALS AND METHODS

The experiment was carried out in pots in the glasshouse. Seeds of six cabbage varieties (namely KK Cross, KY Cross, Sri Gowa, US Tropical, Autumn Queen and

Eiyu) were sown in the nursery. After one month the seedlings were transplanted into five-hole clay pots of 30-cm diameter x 23.5 cm high. Two plants were used for each treatment. The experiment was conducted in a randomized complete block design in three replicates. Leaves of the six varieties were inoculated with a bacterial suspension ( $10^9$  cells/ml) of the most virulent isolate of *Xanthomonas campestris* pv. *campestris* (Pammel) Dowson at 1.5 months after transplanting. The pinprick inoculation method was used.

All the whorls of leaves were inoculated. Each leaf was inoculated at two points, one on either side of the midrib in the centre of the leaf segment between two veins. Three leaves were inoculated in such manner for each whorl.

One-day old culture of *X. campestris* pv. *campestris* grown on nutrient dextrose agar slants was used to prepare suspension of about  $10^9$  cells/ml in distilled water and used for inoculation purposes. Lesion development was recorded daily up to the 14th day after inoculation according to the arbitrary scale of 0 to 5 as shown in *Table 1*.

### RESULTS AND DISCUSSION

Typical bacterial blight symptoms appeared six to seven days after inoculation for all six cabbage varieties. There was no

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Table 1. Scale for assessing the resistance of cabbage varieties to bacterial blight disease caused by *Xanthomonas campestris* under artificial inoculation condition

Scale	Lesion description	Resistance/susceptibility
0	No lesion	Highly resistant
1	Lesion negligible	Resistant
2	Lesion expands but limited	Moderately resistant
3	Lesion covers 1/2 the leaf segment	Moderately susceptible
4	Lesion covers 3/4 to entire leaf segment	Susceptible
5	Lesion spreads to other leaf segment	Highly susceptible

Note: Assessment was made 14 days after inoculation.

Table 2. Effects of *Xanthomonas campestris* on the symptom appearance of bacterial blight disease of cabbage with respect to varieties and positions of leaves

Statistical test	Symptom appearance (DAI)	
	Variety	Whorl of leaves <sup>+</sup>
Test of significance	N.S.	
DMRT	Eiyu = 6.5a	5th = 6.7a
	US Tropical = 6.4ab	4th = 6.4ab
	KK Cross = 6.2ab	3rd = 6.2abc
	KY Cross = 6.2ab	1st = 6.1bc
	Sri Gowa = 6.1ab	2nd = 5.8c
	Autumn Queen = 6.0b	
S.E. (Mean)	0.17	0.15

DAI = Days after inoculation.

<sup>+</sup> 1st to 5th whorls of leaves were from the oldest to the youngest progressively.

\*\*Significant at 1% level.

significant difference in the number of days symptoms took to appear among all the varieties (Table 2), although Eiyu took slightly longer time (6.5 days) compared with other varieties. However, the positions of the various whorls of leaves did have a significant effect on the number of days symptoms took to appear (Table 2). The trend shows that symptoms developed slower in the younger leaves than older leaves. In this case the fifth whorl of leaves (the youngest) took about seven days for symptoms to develop while the first and second whorl took only about six days. Symptoms developed most readily and quickest (five to six days) on the leaves of the second whorl. Screening for varietal resistance could therefore be done using the

leaves of the second whorl.

With regard to disease scores (Table 3), there was no significant difference among the six varieties and among the different whorls of leaves at seven days after inoculation (DAI). However, at 14 DAI, although the position of the different whorls of leaves did not have a significant influence on the disease score, there was a significant difference in the varietal reactions to the disease (Plate 1). KY Cross was the most susceptible being significantly different from the rest. KK Cross, Sri Gowa and US Tropical were susceptible while Autumn Queen and Eiyu were moderately susceptible (Plate 1). Eiyu was the best of all the varieties tested, giving a moderately

Table 3. Reactions of 6 cabbage varieties and 5 whorls of leaves to standard suspension of *Xanthomonas campestris*

Statistical	Disease score <sup>+</sup> 7 DAI		Disease score <sup>+</sup> 14 DAI	
	Variety	Whorl of leaves <sup>++</sup>	Variety	Whorl of leaves <sup>++</sup>
Test of significance	N.S.		**	N.S.
DMRT	KK Cross = 1.2a	2nd = 1.2a	KY Cross = 4.2a	4th = 3.4a
	KY Cross = 1.1a	1st = 1.1a	KK Cross = 3.4b	1st = 3.2a
	Autumn Queen = 1.1a	4th = 1.1a	Sri Gowa = 3.3b	3rd = 3.2a
	US Tropical = 1.0a	3rd = 1.0ab	US Tropical = 3.0b	2nd = 3.2a
	Sri Gowa = 1.0a	5th = 1.9b	Autumn Queen = 2.8bc	5th = 3.0a
	Eiyu = 0.9a		Eiyu = 2.3c	
S.E. (Mean)	0.08	0.07	0.20	0.18

<sup>+</sup>Based on 0-5 scale increasing disease severity (Table 1).  
<sup>++</sup>1st to 5th whorls of leaves were from the oldest to the youngest progressively.  
 \*\*Significant at 1% level.



Plate 1. Highly significant varietal reactions of 6 cabbage varieties to bacterial blight disease 14 days after inoculation with *Xanthomonas campestris* pv. *campestris* (Pammel) Dowson (Note: Varieties Autumn Queen and Eiyu were significantly better than the other 4 varieties).

susceptible score of 2.3 against the most virulent isolate. The results obtained were consistent with field observations and field trials especially during the dry months.

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#### ABSTRACT

There was no varietal difference regarding the time of symptom appearance. The various positions of the leaves responded significantly to the time of symptom appearance. The leaves of second whorl (from the bottom) developed symptoms fastest at five to six days after inoculation. Autumn Queen and Eiyu were found to be moderately susceptible with Eiyu performing better.

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