

## Note

### A Tipburn-Resistant Head Cabbage Variety for Guam

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In the 1970s, head cabbage was one of the major vegetable crops grown on Guam. The variety K-K-Cross was commonly cultivated by the farmers with manual application of fertilizers in split doses and sprinkler irrigation. Since the mid 1980s farmers have adopted drip irrigation and fertigation techniques. Coinciding with this change in the cultural practice, farmers in northern Guam, where they farm on coral alkaline soil, have started to cultivate head cabbage. Concomitant with this development, the tipburn disorder of head cabbage has become a serious problem and a major challenge to deal with.

Tipburn of head cabbage, Chinese cabbage and lettuce has been known to be a serious problem in many parts of the world. Collier & Tibbitts (1982) reviewed tipburn on vegetables in general and on lettuce in particular and attributed it to a calcium related disorder. Imai (1987) attributed tipburn in Chinese cabbage to ammonium ( $\text{NH}_4\text{-N}$ ) toxicity rather than calcium deficiency. Vavrina et al. (1993) found urea used as a nitrogen source for Chinese cabbage produced less tipburn than  $\text{NH}_4\text{NO}_3$ . Feigin et al. (1991) reported salinity to cause tipburn in Chinese cabbage. Pressman et al. (1993) stated vernalization markedly increased the tipburn in Chinese cabbage. A clear understanding of the causes of tipburn disorder is still lacking. However, varieties of lettuce and cabbage have been produced that will tolerate tipburn (Ryder 1995; H. Kaneko, Pers. Com.) In this study, we report our evaluation of the effect of N source and the varietal response to tipburn of head cabbage.

A field experiment was conducted at the Yigo experimental farm. The soil type in the field used for this experiment has been classified as clayey, gibbsitic isohyperthermic, Tropeptic Eustrustox which is very shallow, highly calcarious with limited moisture holding capacity.

A split plot design with 4 replications and treatments consisting of cabbage varieties K-K-Cross and Scorpio in main plots and the nitrogen sources, ammonium sulfate for  $\text{NH}_4\text{-N}$  and potassium nitrate for  $\text{NO}_3\text{-N}$  in subplots.

Each subplot consisted of a row of cabbage of 30.0 m length with two driplines laid on either sides of the row and covered with a black plastic mulch. The spacing given was 30.5 cm between plants within the row and 1.5 m between

Table 1. Mean weight (g) of cabbage cv. K-K Cross and Scorpio in  $\text{NH}_4\text{-N}$  and  $\text{NO}_3\text{-N}$  applications.

Varieties	Mean Yield (g) per treatment		% Tipburn Symptoms
	$\text{NH}_4\text{-N}$	$\text{NO}_3\text{-N}$	
K.K. Cross	1,245 $\pm$ 39*	1,106 $\pm$ 41	100
Scorpio	929 $\pm$ 106	931 $\pm$ 94	0

\*n = 10 Samples

rows. A basal dressing with triple super phosphate at 1.8 kg/30.00 m (each row length) was given a week prior to transplanting.

The crop was transplanted on September 11, 1996.  $\text{NH}_4\text{-N}$  was applied in the form of ammonium sulfate at the rate of 24.5g/100 liters of water injected through the drip system twice a week.  $\text{NO}_3\text{-N}$  was given in the form of potassium nitrate at the rate of 39.5g/100 liters of water twice a week. On either side of the experimental field a row each of Chinese cabbage cv. Tempest, radish cv. Minowase Summer No. 3 and Indian mustard were planted as trap crops for pest control. In addition Dibrom 8® emulsive at the rate of 10.3 ml/L was sprayed when needed to control the pests especially the cutworm, *Spodoptera litura*. Cabbage heads were harvested at random in each treatment, weighed and observed for tipburn disorder by cutting the head longitudinally in the first week of January 1997.

The weight and incidence of tipburn in the harvested heads of cabbage is given in table 1. There was no difference in weights of cabbage heads in the  $\text{NH}_4\text{-N}$  and  $\text{NO}_3\text{-N}$  treatments of Scorpio. However, in K-K Cross, the  $\text{NH}_4\text{-N}$  treatment yielded significantly heavier heads than the  $\text{NO}_3\text{-N}$  treatment. All heads of the variety K-K-Cross exhibited tipburn and variety Scorpio was free of tipburn.

Under the environmental conditions of Guam, the variety Scorpio seems to be resistant to tipburn. According to Shimbuku et al., (1996) this variety is also partially resistant to the attack of diamondback moth in Hawaii. There was no incidence of diamondback moth during the period of this experiment.

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