

Abstract

A two year field experiment was conducted during the 2004 and 2005 growing seasons at the Mississippi State University, Coastal Research and Extension Center's Beaumont Horticultural Unit to evaluate Asian cucumber yield performance under coastal Mississippi environmental conditions. The cucumber varieties: "Natsuhikari", "Tasty Queen", "Crisp Petrel", "Tokiva", "White Sun", and "Summer Express" were grown conventionally on raised beds using drip irrigation and plastic mulch on McLaurin sandy loam soil. The results revealed that growing season greatly affected fruit load and quality. The total average yield for cucumbers in 2004 was 67.98 t ha⁻¹ and was 65.6% greater than the 2005 average yield. Yield among varieties showed significant differences. Yield of "Natsuhikari" was highest at 79.84 t ha⁻¹, and was significantly greater than "Crisp Petrel", "Tokiva", "White Sun" and "Summer Express" yields by 7.25, 12.92, 23.53, and 24.06 t ha⁻¹, respectively, in 2004. However, yield of "Tasty Queen" was significantly higher than "Summer Express", "Crisp Petrel", "Natsuhikari", "White Sun", and "Tokiva" yields, exceeding each by 4.32, 10.53, 10.95, 14.72, and 15.05 t ha⁻¹, respectively in 2005 (at $\alpha=0.05$, using Duncan's Multiple Range Test). There was not a significant difference in cucumber yield between "Natsuhikari" and "Tasty Queen", "Crisp Petrel" and "Tokiva", or "White Sun" and "Summer Express" in 2004. Nor were there significant differences between "Summer Express" and "Crisp Petrel", or "Natsuhikari", "White Sun" and "Tokiva" in 2005. Based on two years of research results, the "Natsuhikari" and "Tasty Queen" varieties performed well, revealed high yield, displayed potential disease resistance and adaptability to the coastal Mississippi soil-climatic environment.

Introduction

Asian varieties of vegetables can provide new market niches for growers. However, productivity of Asian vegetable crops varies and depends on environmental factors. Development of production technology for high value Asian vegetables is important to generate additional income for producers. Furthermore, there is growing demand for Asian vegetables because of increasing Asian ethnic populations, especially in coastal Mississippi. Hence, there is great interest in production of Asian vegetables. However, there is little scientific information on the production and potential yield of Asian vegetables in the soil-climatic conditions of Mississippi, which is the key restraint limiting their cultivation in the state. Therefore, the objective of these field experiments were to evaluate productivity of Asian varieties of cucumber under coastal Mississippi environmental conditions.

Materials and Methods

Field experiments were conducted during the 2004-2005 growing seasons at the Mississippi State University, Coastal Research and Extension Center's Beaumont Horticultural Unit. The soil at the experimental field was McLaurin sandy loam. Cucumber varieties: "Natsuhikari", "Tasty Queen", "Crisp Petrel", "Tokiva" "White Sun", and "Summer Express" were grown conventionally on raised beds using a single drip irrigation line and black polyethylene plastic. Asian cucumber transplants were grown in plastic trays using professional growing mix over 5-6 weeks in the greenhouse and transplanted by hand in staggered double rows into the filed plots which were 6.1 x 1.83 m on centers, with distance between plants 60.96 cm with 10 plants in each plot. Cucumber fruits were harvested three times each week by hand for 6 weeks.

Table 1. Yield (t ha⁻¹) and fruit number (thousand ha⁻¹) of Asian cucumber on McLaurin sandy loam soil.

Varieties	Total yield				Cull fruits	
	Weight *		Number*		Number*	
	2004	2005	2004	2005	2004	2006
Natsuhikari	79.8a	39.4ba	218.4a	114.4bac	15.4ba	31.2b
Tasty Queen	76.4a	50.3a	206.1a	136.3a	17.5a	23.6cb
Crisp Petrel	72.6ba	39.8ba	191.7ba	113.9bac	13.5ba	32.1b
Tokiva	66.9ba	35.3b	177.2bac	94.8c	6.5b	21.5cb
White Sun	56.3b	35.6b	156.5bc	107.0bc	17.5a	57.4a
Summer Express	55.8b	46.0ba	141.1c	132.5ba	7.9ba	16.6c

*Values with the same letter are not significantly different from each other using Duncan's Significant differences at $\alpha=0.05$.

Results and Discussion

The results revealed (Table 1) that total yield of cucumber per hectare in the 2004 growing season ranged between 55.8 and 79.8 t ha⁻¹, whereas in 2005, the yield of cucumber per hectare ranged between 35.6 and 50.3 t ha⁻¹. So, the total yield, total fruits number on average in 2004 were higher by 61.5 and 51.3%, respectively, than in 2005. In contrast, cull fruits numbers on average in 2005 was higher by 124.1% than in 2004. Yield among varieties showed significant differences. Yield of "Natsuhikari" was highest at 79.8 t ha⁻¹, and was significantly greater than, "White Sun" and "Summer Express" yields by 23.5, and 24 t ha⁻¹, respectively, in 2004. The total yield of "Tasty Queen" also was significantly greater than "White Sun" and "Summer Xpress", by 20.1 and 20.6 t ha⁻¹, respectively in 2004. "Tasty Queen" resulted in the highest total yield at 50.3 t ha⁻¹, and was significantly greater than "White Sun" by 14.7 t ha⁻¹ in 2005.

There was not a significant difference in cucumber yield between "Natsuhikari" and "Tasty Queen", or "White Sun" and "Summer Express" in 2004; nor were there significant differences between "Natsuhikari", "Crisp Petrel" or "Summer Express" in 2005. The high temperature affected cucumber and showed some effect upon cucumber response. Particularly, monthly average maximum air temperatures during the cucumber reproductive period in June-July 2005 were higher than in May-June 2004 (Fig. 1) with daily average maximum air temperatures in June 16 at 35 °C, and July 4 at 36.1 °C in 2005 (unpublished). Cull fruit cucumber number on average increased by 124.1% (Table 1) in 2005. Hence, prolonged high air temperature conditions during cucumber pollen formation presumably negatively affected crop fertilization and fruit set. In particular, saturated humidity causes loss of germination power of cucumber pollen as rapidly as dry conditions (0 – 30% relative humidity) at 30 °C (Hiroshi, 1960), and cucumber male sterility, as a high-temperature injury appears over 30 °C (Masahumi et al., 2011).

Conclusion

The results from yield analysis of Asian varieties of cucumbers (*Cucumis sativus* L.), grown in field environmental conditions, revealed that some of these varieties could be potentially valuable vegetable crops to be incorporated into production systems in Coastal Mississippi. The cucumber varieties "Natsuhikari", "Tasty Queen" revealed high productivity, and than other tested varieties, performed well, displayed potential disease resistance and tolerance to the coastal Mississippi soil-climatic environmental conditions. The Asian varieties of cucumber yield results also could benefit breeding programs to develop high temperature tolerant vegetable varieties.

Literature Cited

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Fig. 2. Fruit length of cucumber "Natsuhikari", "Tasty Queen", "Crisp Petrel", "Tokiva", "White Sun", and "Summer Express".

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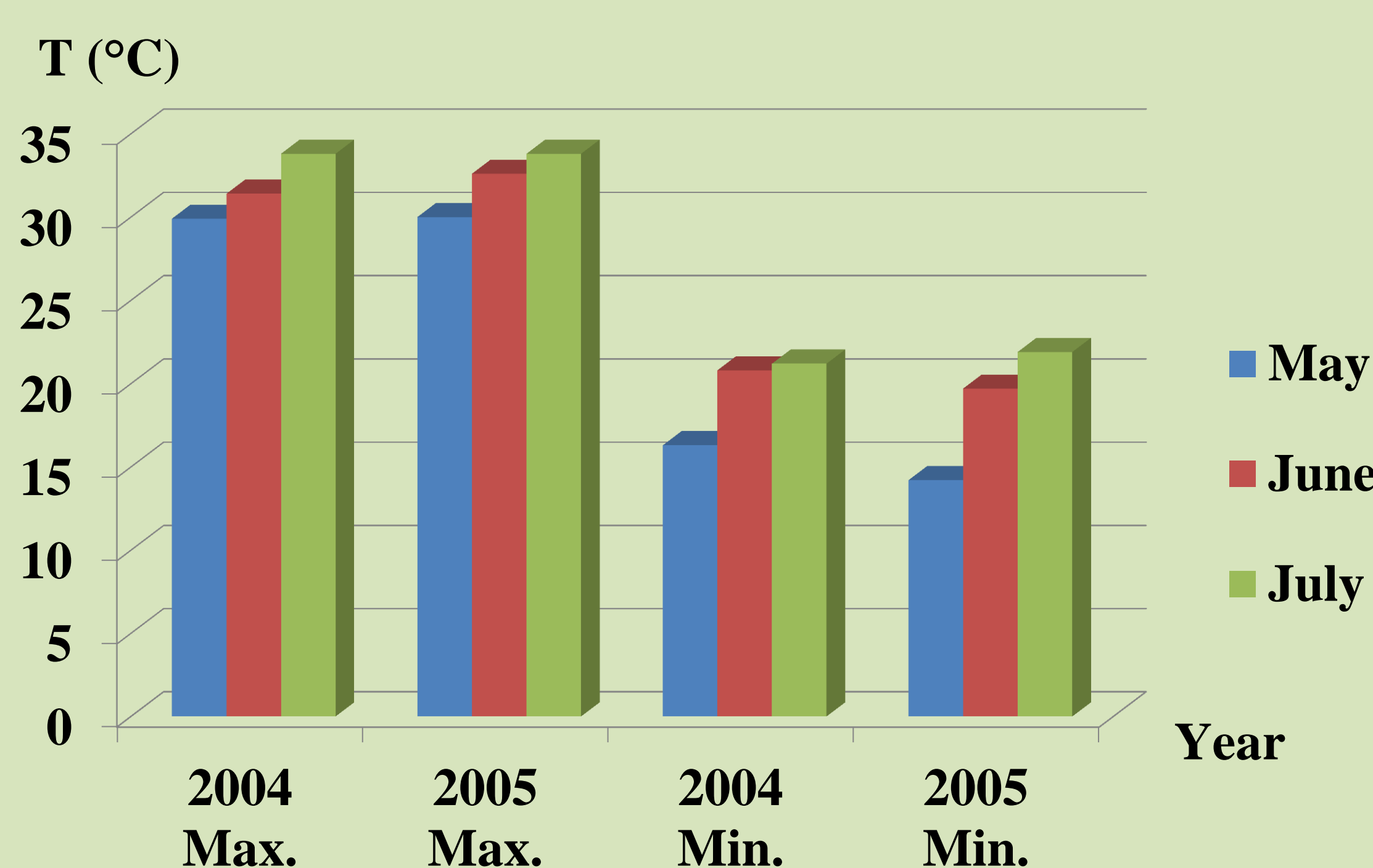


Fig. 1. Air temperature during the experimental period at Beaumont, MS