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'Super Dwarf' Rice: Temperature Studies

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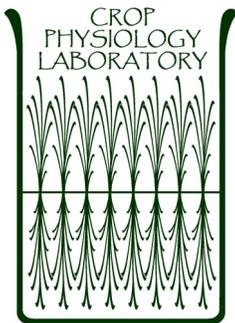
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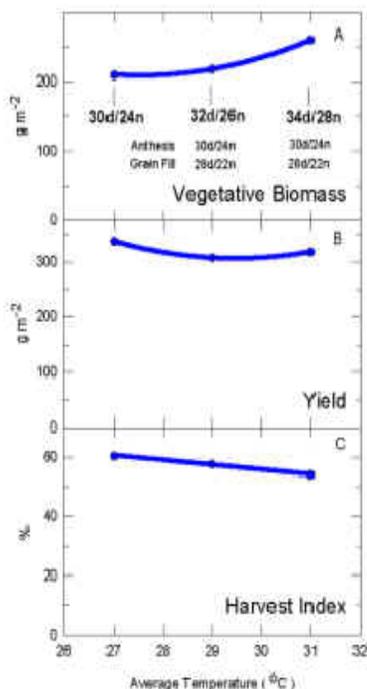




'Super Dwarf' Rice: Temperature Studies

Steve Klassen and B. Bugbee - 1999

Detailed temperature studies are a prerequisite to the optimization of crop productivity because field studies at ambient CO₂ provide only a general guide to optimal temperatures. Meristem temperature has a profound effect on crop development rate, and the optimum temperature usually decreases as the crop matures. Previous studies with semi-dwarf rice (Ai-nan-tsao & 29-Lu-1) indicated that temperatures above about 33 °C reduce seed set if they occur during anthesis. In rice, high temperatures are especially detrimental if there is rapid dark-to-light temperature increase. Conversely, average day/night temperatures in the mid 20's delay heading and cause an undesirable increase in vegetative biomass.



We examined 3 temperatures prior to anthesis (30/24; 32/26; & 34/28). Temperature of all treatments was decreased to 30/24 at 3-d prior to anthesis and further decreased to 28/22 during grain fill to prolong the duration of grain fill and increase harvest index. Vegetative biomass was increased by 10% per °C with increasing temperature, but seed yield was not significantly increased at the warmer temperatures so harvest index decreased. Super dwarf rice continues forming tillers throughout vegetative growth, presumably because of the lack of apical dominance caused by a lack of active gibberellic acid. At the relatively low plant density used in this study (100 plants per m²), many late tillers were formed and 25 to 30% of the heads were sterile. We are now conducting density studies and adding low levels of GA to the nutrient solution to decrease late tillers and improve harvest index.

