Agricultural Sciences

Performance of Pacific White Shrimp Litopenaeus vannamei Raised in Static Heterotrophic Tank Systems Exposed to Different Light Sources and Intensities. David R. Wood*, Russel S. Neal, Brian M. Boudreau, Shawn D. Coyle and James H. Tidwell, Aquaculture Research Center, Kentucky State University, Frankfort, KY 40601.

The market for shrimp has consistently shown high consumer demand. To support the development of inland shrimp culture in the United States, a trial was conducted to evaluate the effect of different light regimes on shrimp cultured in intensive heterotrophic systems. The trial used 3.5-m³ polyethylene tanks with five light treatments: 1) Sunlight with natural diurnal cycle acting as control (mildday - 718 lux); 2) one metal halide light (1074 lux); 3) one fluorescent light (214 lux); 4) two fluorescent lights (428 lux); and 5) three fluorescent lights (642 lux). There were three replicate tanks per treatment and each was separated by black plastic to prevent light contamination. Each tank was stocked with a density of 465 shrimp/m³ at an initial mean weight of 0.4 grams. Tanks were harvested after 92 days and final average individual weight, percent survival, harvest yield, and FCR were determined. Light treatment had a significant impact (P < 0.01) on average individual weight, survival, harvest yield (kg/m³), and feed conversion ratio. Differences in production parameters among shrimp in the Natural Light (control), Metal Halide, and 1-Fluorescent treatments were not significantly different (P > 0.05). However, there was a linear negative relationship (P < 0.01; R² = 0.758) between the number of fluorescent fixtures and harvest yield, survival, and feed conversion efficiency. Decreased survival in 2 and 3-Fluorescent fixture treatments appeared to be related to greater concentrations of filamentous bacteria in those tanks. Natural Light, Metal Halide, and low levels of fluorescent light appeared to inhibit, or did not promote, high concentrations of those bacteria.

A Spacing Calculator for Mixed Plantings. Michael K. Bomford, Community Research Service, Kentucky State University, Frankfort, KY 40601.

The most appropriate way to compare mixed plantings to pure stands is a matter of debate among ecologists and agricultural scientists but a consensus has emerged that mixed plantings tend to be more productive. Few horticulture extension materials offer practical advice for designing mixed plantings. One exception, a popular series of gardening manuals, recommends that plant spacing in mixtures be set to the mean of monoculture spacing recommendations for component crops. In most cases this results in a lower plant density in mixtures than in segregated pure stands, reducing the likelihood of realizing a mixture yield advantage. An improved method for calculating mixture spacing is proposed that sets total plant density in mixed plantings equal to the combined density of segregated pure stands. This method is intended to allow meaningful comparisons of mixtures to pure stands, and increase the likelihood of realizing a yield advantage from mixed planting. The method derives mixture spacing recommendations from monoculture spacing and the proportion of the mixture accounted for by each crop. A mixture spacing calculator that uses the method is available online (http://organic.ksu.edu/Companion_spacing.html).


Growing concern about foreign energy dependence has led to increased interest in biofuels as domestically-produced, alternative energy sources. The United States is now the world’s largest producer of ethanol fermented from plant carbohydrates. More than 95% of this ethanol is currently made from the grain of corn (Zea mays L.) through a production process that consumes 75–90% as much energy as is available from the fuel. Other crops may offer superior energy returns, or be more compatible with sustainable production systems suitable for adoption by limited-resource farmers. We compared carbohydrate yield of corn, Jerusalem artichoke (Helianthus tuberosus L.), sweet potato (Ipomoea batatas L.), and sweet sorghum (Sorghum bicolor L.) grown organically in irrigated 8 m² plots in a completely randomized design with four replicates. Sweet potato and sweet sorghum, respectively, produced approximately 580 and 280% more carbohydrate per unit cultivated area than sweet corn. Sweet sorghum and sweet potato show potential as alternative biofuel feedstock crops, compatible with low input production systems.

Grain Yield Loss Due to Variation of In-row Spacing of Corn. Todd Ballard*, Marvin Russell, Elmer Gray, Todd Willian and Martin Stone, Department of Agriculture, Western Kentucky University, Bowling Green, KY 42101.

Uneven plant spacing within rows of corn (Zea mays L.) usually affects grain yield negatively. Average plant spacing is an incomplete index of density; plant distribution must also be considered. In 2007, relationships between corn yields and in-row spacings were examined using different indices of spacing (distance between