PROJECT NO. RP-14

ANNUAL REPORT
COMPREHENSIVE RESEARCH ON RICE
January 1, 2004 - December 31, 2004

PROJECT TITLE: Spatial and temporal variation in the composition of filamentous algae present in California rice fields.

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LEVEL OF 2004 FUNDING: $15,000

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

1. During the 30 days following planting, survey three rice fields designated by Rice Research Board representatives and identify algal species present.
2. During the 30 days following planting, collect and analyze water samples from these fields for nutrients and other factors.
3. During the 30 days following planting, collect and analyze soil samples from these fields for fertility and copper levels.

SUMMARY OF 2004 RESEARCH (MAJOR ACCOMPLISHMENTS) BY OBJECTIVE:

Objective 1. The temporal trend in algal abundance involves a shift from dominance by green algae / diatoms early in May to dominance by blue-green algae (almost totally *Nostoc*) in late May early June The same species occurred in all the fields at around the same time. The most abundant species that can be referred to as “black algae” collected from these fields is *Nostoc*. This species can tolerate relatively high levels of copper due to its production of mucilage. Thus, it is likely that the copper sulfate treatments are selecting for *Nostoc*.

Objective 2. There was considerable variation in nearly all of the twenty-two water quality parameters measured among the 8 fields that were sampled. The results from multiple regression analysis showed that total algal biomass was negatively related to total alkalinity and sulfate concentration, but was positively related to the concentration of ammonium and sodium in the water and also to the concentration of calcium divided by 0.25 mg/L of copper. These variables explained 49% of the variance associated with total algal biomass.

Objective 3. Soil nitrates averaged 6.86 mg / kg, range 1.8 to 42.3 mg / kg. The mean and range for Olsen extractable phosphorus was 26.84 and 6.8 to 69.1 mg / kg, respectively. Exchangeable potassium was 203.9 mg / kg on average with a minimum of 60 mg / kg and a maximum of 353 mg / kg. Total copper varied from 56.6 to 85.6 mg / kg, with a mean of 69.6 mg / kg. The fraction of total copper that is potentially available plants, animals, and microbes, ranges from 15 to 31% of the total copper in the soil for the rice fields that we sampled.

PUBLICATIONS OR REPORTS: None

CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

We sampled eight rice fields every two days from May 1 to June 1 for twenty-two water quality parameters and algal biomass. We also collected samples of the algal material for identification. Soil samples were collected prior to filling the fields with water and analyzed for nitrates, Olsen extractable phosphorus, exchangeable potassium, total copper, and extractable copper. The temporal trend in algal abundance involved a shift from dominance by green algae (*Sphaeroplea*, *Tribonema*, *Ankistrodesmus*, *Tetraspora*) and diatoms (*Navicula*) early in May to dominance by blue-green algae (almost totally *Nostoc*, with *Anabaena* and *Phormidium* also present) in late May early June The same species occurred in all the fields at around the same time. The most abundant species that can be referred to as "black algae" collected from these fields is *Nostoc*. This species can tolerate relatively high levels of copper due to its production of mucilage. Thus, it is likely that the copper sulfate treatments are selecting for *Nostoc*. There was considerable variation in nearly all of the twenty-two water quality parameters measured among the 8 fields that were sampled. The results from multiple regression analysis showed that total algal biomass was negatively related to total alkalinity and sulfate concentration, but was positively related to the concentration of ammonium and sodium in the water and also to the concentration of calcium divided by 0.25 mg/L of copper. These variables explained 49% of the variance associated with total algal biomass. Soil nitrates averaged 6.86 mg / kg, range 1.8 to 42.3 mg / kg. The mean and range for Olsen extractable phosphorus was 26.84 and 6.8 to 69.1 mg / kg, respectively. Exchangeable potassium was 203.9 mg / kg on average with a minimum of 60 mg / kg and a maximum of 353 mg / kg. Total copper varied from 56.6 to 85.6 mg / kg, with a mean of 69.6 mg / kg. The fraction of total copper that is potentially available plants, animals, and microbes, ranges from 15 to 31% of the total copper in the soil for the rice fields that we sampled.