

Cooperative State Research, Education, and Extension Service (CSREES) Current Research Information System (CRIS) Reports

ACCESSION NO: 0188571 **SUBFILE:** CRIS

PROJ NO: WVAX-BIOPLEX **AGENCY:** CSREES WVAX

PROJ TYPE: OTHER GRANTS **PROJ STATUS:** EXTENDED

CONTRACT/GRANT/AGREEMENT NO: 2001-38850-10529 **PROPOSAL NO:** 2002-036203

START: 15 JUN 2001 **TERM:** 14 JUN 2003 **GRANT YR:** 2002

GRANT AMT: \$561,600

INVESTIGATOR: Chatfield, J. M.; Liedl, B.; Huber, D.; Ruhnke, T.

PERFORMING INSTITUTION:

BIOLOGY

WEST VIRGINIA STATE COLLEGE

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INSTITUTE, WEST VIRGINIA 25112

ORGANIC WASTE TREATMENT USING THERMOPHILIC ANAEROBIC DIGESTION (BIOPLEX) PHASE 2

OBJECTIVES: 1) Develop a fermentation laboratory containing continuous stir tank, anaerobic filter and fluidized bed anaerobic bioreactors. Establish physical and biochemical parameters to maintain and transfer these discoveries to the industrial sector. 2) The reduction in pathogens during digestion will be studied, with emphasis on Cryptosporidium, Salmonella and E. coli. 3) Determine the feasibility of using microbial protein from anaerobically digested poultry litter as a substitute for fishmeal in trout feeds will be determined. 4) Evaluate the microbial community dynamics of thermophilic anaerobic digesters. 5) Demonstrate the efficacy of digested poultry litter solids as a replacement for commercial fertilizers. As well as, evaluate a hydroponic system for capacity to remediate liquid effluent.

APPROACH: Fifty-liter laboratory digesters and a 10,000-gallon pilot plant digester will be used to refine the biology, biochemistry and control of anaerobic digestion. Promising discoveries will be demonstrated in the pilot plant thus establishing immediate industrial application. Fish feedstock and fertilizer experiments using both solid and liquid digester effluents are planned to establish novel applications and potential commercial value.

NON-TECHNICAL SUMMARY: Increasing production of agricultural waste associated with farming activities impacts health, economic and environmental welfare. The "Bioplex" project is comprised of five research projects involving the utilization of agricultural waste and thermophilic anaerobic digestion. Innovations and developments resulting from these studies will result in both more efficient and commercially viable digesters.

PROGRESS: 2001/01 TO 2001/12

1. Construction of the fermentation lab was completed and 3 digester model types were seeded to establish microbial communities. 2. A 20-day *Cryptosporidium muris* oocyst removal study was performed. Results showed a 97% removal of oocysts. Experiments using *Cryptosporidium parvum* have commenced. 3. Aquaculture experiments have been delayed due to troubleshooting of the water cooling system in the aquaculture lab. Feed trials using recovered microbial proteins from the pilot plant digester will begin in June. 4. Characterization of the microbial community in the pilot plant reactor is underway. Using Bacteria and Archea specific primers, we have PCR-amplified 16S rDNA from extracted total community DNA. These were used for construction of two 16S rRNA gene libraries using TA cloning. 5. Raised bed fertilizer trials consisted of 4 treatments and a control on blueberries, tomatoes, potatoes and corn. Results showed clear responses to fertilization using the digested litter.

PUBLICATIONS: 2001/01 TO 2001/12

Stafford, DA; Ruhnke, T, Huber, D; Chatfield, M and Hubbard, H. 2002. Microbial Diversity of Thermophilic Anaerobic Digesters and Control in *cryptosporidium muris* Oocyst Removal. World Water Congress Proceedings (April 2002 Melbourne, Australia).

PROJECT CONTACT:

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ACCESSION NO: 7001809 **SUBFILE:** ICAR

PROJ NO: 16970 **AGENCY:** UNIVERSITIES **TERM:** 30 APR 1998 **FY:** 1997

INVESTIGATOR: MOCCIA R; TECH

PERFORMING INSTITUTION:

UNIVERSITY OF GUELPH ONTARIO AGRICULTURAL COLLEGE

Guelph, Ontario N1G 2W1

DEVELOPMENT OF QUANTITATIVE PHYSIOLOGICAL MEASURES OF THE WELFARE STATUS OF CULTURED SALMONID FISHES.

CONTACT:

Name: Moccia, R.

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ACCESSION NO: 7001647 **SUBFILE:** ICAR **FY:** 1997

INVESTIGATOR: GRANT J W A; ROBB S; STEINGRIMSSON S; TECH

PERFORMING INSTITUTION:

CONCORDIA UNIVERSITY

1455 de Maisonneuve Boulevard West

Montreal, Quebec H3G 1M8

RESOURCE DEFENCE BEHAVIOUR IN FISHES

NARRATIVE: IMPACT: Our research has implications for aquaculturists who want to maximize production of uniformly sized fish. This can be accomplished by presenting food in such a way to reduce aggression and monopolization of food within groups. We have developed a simple regression model to predict stocking densities of salmonid fish in the wild and in aquaculture conditions.

OBJECTIVES: To determine how resource distribution (food and mates) influences the aggressive behaviour and uneven distribution of resources within a group of fishes. To determine whether territory size limits the density of stream-dwelling salmonid fishes.

PROGRESS:

Aggressive behaviour and monopolization of resources increase when resources are spatially clumped, temporally dispersed and spatially predictable. Territory size is a good predictor of the maximum density of juvenile salmonids in streams and of the occurrence of density-dependent population regulation.

PROJECT CONTACT:

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COOPERATING ESTABLISHMENT:

University of Guelph

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FUNDING ESTABLISHMENT:

Natural Sciences and Engineering Research Council

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ACCESSION NO: 7000413 **SUBFILE:** ICAR

PROJ NO: 2 **AGENCY:** OTHER FEDERAL

START: 01 APR 1990 **TERM:** 31 MAR 1994 **FY:** 1997

INVESTIGATOR: DE MARCH B G E

PERFORMING INSTITUTION:

FISHERIES AND OCEANS CANADA, CENTRAL AND ARCTIC REGION FRESHWATER
INSTITUTE

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Winnipeg, Manitoba R3T 2N6

INCUBATION METHODOLOGY IN ARCTIC CHARR

NARRATIVE: IMPACT: Egg and juvenile supply is a major factor limiting the development of the Arctic charr aquaculture industry. Methods of improving egg quality had to be identified. In fact, very low temperatures may be required for successful incubation.

OBJECTIVES: This experiment was done with the objective of finding methods of improving hatching success.

PROGRESS:

Project completed 1995. Manuscript "Effects of incubation temperature on the hatching success of Arctic charr (*Salvelinus alpinus*)" has been submitted for publication in Prog. Fish-Cult.

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