

Fecal Coliform Strain Identification to Facilitate Water Resource Management in South Dakota

Erick Jorgenson

Abstract

Water pollution by fecal coliforms is an increasingly important issue throughout the nation. The past 20 years have provided a dramatic growth in bacterial source tracking methods. In our study a database of approximately 2800 *E. coli* isolates from seven different host sources obtained from four different ecoregions in South Dakota is being constructed. *E. coli* is isolated from raw fecal samples and wastewater samples on mFC and EMB agar plates. An EC-Mug assay is performed to confirm that each isolated strain is *E. coli*. These isolates are sent to Florida for the antibiotic resistance analysis and the results and database are sent back here for statistical analysis. Once comparisons between ecoregions and animals are made the testing of the database will begin. Water samples with a known source of pollution will be tested. Finally, blind water samples will be taken from various lakes and streams to implement the bacterial source tracking method and the database will be turned over to the DENR and the State Health Department.

Expression of stem rust resistance gene Sr25 in wheat

Lanfang Bai

Abstract

Assuming that there are differential gene expression profiles between the resistant and susceptible wheat lines during stem rust development, the infection-induced expression of stem rust resistance gene Sr25 was investigated in leaves of near-isogenic lines Sr25/9* LMPG and LMPG-6 (moderately resistant and susceptible to the stem rust fungus (*Puccinia graminis* f.sp. *tritici*) using differential display. The preliminary data showed several types of gene expression patterns: 1) Polymorphic ESTs present only in LMPG-6; 2) ESTs present only in Sr25/9*LMPG (both oil and pathogen inoculated); 3) ESTs present both in the pathogen inoculated LMPG-6 and Sr25/9*LMPG; 4) ESTs present only in oil inoculated Sr25/9*LMPG; 5) ESTs present only in pathogen inoculated Sr25/9*LMPG. The ESTs that are only expressed in pathogen inoculated Sr25/9*LMPG should be the ones that are most likely related to the resistance conferred by Sr25. ESTs of interest will be further identified, cloned and sequenced as well as further verified by Northern and Southern blots.

Mass Balance of Phytosterols and Tocols During Corn Ethanol Production

By: Tina Rausch

Abstract:

Phytosterols and tocopherols (tocopherols and tocotrienols, otherwise referred to as vitamin E) have the potential for many health benefits associated with atherosclerosis, low-density lipoproteins (LDL) oxidation, smooth muscle proliferation, and cancers. Because of these potential health benefits, any resources containing phytosterols and tocopherols are very valuable. Corn is a good source of these phytochemicals, however the byproducts of dry-milling plants remain under-utilized. Therefore, by determining the quantities of phytosterols and tocopherols in various fractions throughout the dry-milling process, we are able to tap into a new source for these phytochemicals, increase the demand for corn-based products, and impact our economy.

Chemopreventive Effects Of Dietary Flaxseed Oil On Colon Tumor Development In Rats

Karthika Nabarajan

Abstract

Fish oil containing high levels of omega-3 fatty acids reduced colon tumor development in chemically-induced carcinogenesis as compared to dietary corn oil containing high levels of omega-6 fatty acids. A study on the effects of dietary mustard oil containing higher levels of omega-3 fatty acids than fish oils, conducted in our laboratory showed a significant decrease in colon tumor development. Flaxseed, grown in the Dakota's contains oil, that has a higher percentage of omega-3 fatty acids than both mustard and fish oils. The purpose of the present investigation is to determine if dietary flaxseed oil is an effective chemopreventive agent in colon tumor development.

Male Fischer rats, two groups of 30 each were assigned to the AIN-93M diet supplemented with 15% corn oil and 15% flaxseed oil respectively. Carcinogenesis was initiated with subcutaneous doses of azoxymethane (15 mg/kg) once a week for three weeks. At the end of 40 weeks after initiation, the rats will be sacrificed and the incidence and multiplicity of the tumors in the colon will be determined. The fatty acid composition of the serum, colon and tumors will be estimated using Gas Chromatography-Mass Spectroscopy (GC/MS). The cyclooxygenase activity in colon and tumor samples will also be determined to elucidate the possible mechanism of action. The rats are weighed weekly and there has been no significant difference in the weight gain of both groups.

The omega-3 (linolenic) and omega-6 (linoleic) fatty acids in the oils and the diets were extracted by chloroform-methanol followed by methyl esterification. GC/MS was used to determine the percentage of fatty acids present. The corn oil and corn oil diet contained 58% and 64% linoleic acid and 0% linolenic acid whereas the flaxseed oil and the flaxseed oil diet contained 18% and 19% of linoleic acid and 62% and 57% of linolenic acid respectively. The results after the completion of this study will provide the data on the effectiveness of flaxseed oil against colon tumor development. (This study is supported by a grant from SDEPSCoR and EVERSCO LTD, Rhinelander, WI)

Agrobacterium-Mediated Transformation of Soybean for an Antisense Gene

Xiang Liu

Abstract

The purpose of this experiment is to transfer CPT antisense gene into soybean by Agrobacterium-mediated. Agrobacterium tumefaciens contains a Ti plasmid harboring some Vir genes. Vir genes recognize the borders of T-DNA only and form a T-DNA protein complex that then enter host cells. During oil biosynthesis of soybean, diacylglycerol (DAG) is a branch point for oil biosynthesis and membrane biosynthesis. The membrane biosynthesis must be catalyzed by cholinephosphotransferase (CPT). Based on a mechanism that the antisense RNA from an antisense gene can block the translation of mRNA from the corresponding sense gene, it is expected to increase soybean oil biosynthesis by blocking CPT synthesis in transgenic soybean. To obtain the transgenic plants, a CPT antisense gene was inserted into a plasmid to form plasmid pCB-GF1 that contains kanamycin resistance gene for selection. A bar gene and the CPT antisense gene are linked together and harbored by borders. The bar gene resists herbicide and is used as a selecting marker. Plasmid pCB-GF1 is transferred into Agro. EHA105, and then the Agrobacterium carrying pCB-fg1 is used to infect soybean cotyledonary nodes. Some factors that affect transfer frequency are tested while the numbers of survive shoots through herbicide selection are investigated. The transfer DNA sequence and expression will be analyzed after transgenic plants are obtained.