

**RESEARCH PROPOSAL REQUESTING FOR FUNDS  
FROM CCPGA ROYALTIES**

**2010**

***SUBMITTED BY***

***SAMUEL ESSAH***

**Project Title:**

Development of management guidelines for maximum production of marketable size, shape, and quality of fingerling potatoes

**Funding Source**

CCPGA Royalties

**Investigator**

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**Nature and Scope of Research:**

Fingerling potatoes are a growing niche in the potato industry. Consumer interest in fingerlings has been growing in recent years. Growers of this special type potato need to know how to manage the crop in the field in order to produce tuber size, shape, and quality, that satisfy consumer demand. There is the need to conduct field and laboratory research to establish cultural management guidelines for fingerling potato cultivars that are developed from the Colorado potato breeding program. The development of appropriate management guidelines for potato cultivars, require a minimum of two years field research. Evaluation of the response of three fingerling potatoes to nitrogen fertility management and plant population management was conducted in 2009. This proposal seeks to repeat the 2009 studies, and to document appropriate management guidelines for fingerlings.

**Project Objectives**

The primary objective of the proposed project is to establish cultural management guidelines for the successful, sustainable, and economic production of fingerlings, that produce marketable tuber size, shape, and quality tubers acceptable to consumers.

The specific objectives of this project are;

1. Establish optimum nitrogen rates for the production of maximum tuber yield, maximum marketable tuber size, and shape, of fingerling potatoes.
2. Define optimum in-row seed spacing that will allow for the production of maximum yield and marketable fingerling tuber size and shape, of existing cultivars and advanced selections.

## MATERIALS AND METHODS

***Objective 1: Establish optimum nitrogen rates for maximum tuber production of fingerling potatoes with maximum marketable size and shape.***

Nitrogen fertilizer requirements for maximum marketable tuber yield, tuber size, and shape, will differ for different fingerling potatoes. Nitrogen treatment will include four application rates of, 60, 80, and 100 lb N/ac, and a control, where no nitrogen will be applied. There will be a total of 12 nitrogen rate treatments for the three fingerling cultivars to be entered in this study. Each treatment will be replicated four times.

***Objective 2: Define optimum in-row seed spacing that will allow for the production of maximum tuber yield and marketable tuber size and shape, of existing fingerling potatoes and advanced selections.***

In-row seed piece spacing treatments will include planting the seed at 4, 8, and 12 inches. There will be a total of nine seed spacing treatments for the three cultivars to be entered in this study. Each treatment will be replicated four times.

### **Data Collection**

#### *Soil and Water Samples*

Soil samples from experimental plots and water samples from the irrigation well will be taken and analyzed for their nutrient content. This will indicate the amount of residual nitrogen and other nutrients in the soil before planting, and how much nitrate nitrogen is supplied to the crop from the irrigation water at each time of irrigation.

#### *In-Season Plant Sampling and measurements*

The effect of treatments on sprout emergence, crop stand, and canopy volume will be evaluated. During tuber bulking, plants will be sampled to evaluate treatment effects on stem number, tuber number, mean tuber weight, and tuber bulking rate. Petiole samples will be taken at four different dates during the growing season from each nitrogen fertility study plot for nutrient analysis. This will help establish in-season petiole nitrate, phosphorus, and potassium curves for the cultivars entered.

#### *Yield, Tuber size and Tuber Shape Evaluation*

Potato tubers will be harvested and evaluated at the end of the growing season for yield, tuber size and shape. Tubers from each plot will be weighed and graded for length and

diameter. The harvested tubers will be separated into three different groups based on length (< 2 in., 2 to 4 in., > 4 in.). Tuber diameter from these three length groups will be measured and the Length/Diameter ratio determined.

### **Statistical Analysis**

All data will be subjected to analysis of variance to test for main effects and interactions among treatments. When significant interaction effects are detected, the proc mixed procedure in SAS will be used to analyze the data to estimate differences between treatment means.

### **Relationship of Proposed Research to Overall Problem for Potato Growers**

There are no established cultural management guidelines for fingerlings grown in the San Luis Valley. As demand for fingerlings continue to increase, growers will have to know how to grow fingerlings to maximize tuber yield, with maximum marketable tuber size and shape. This proposed study aims at establishing cultural management guidelines for the successful production of fingerlings in the San Luis Valley.

### **Potential for Leveraging Research Results to Outside Funding**

Results obtained from this project could help obtain outside funding. Funding could be obtained from USDA - NIFA as part of the potato development and improvement project, and from USDA-NRCS and Western SARE for nutrient conservation research. Other sources of funding could be from fertilizer companies for nutrient management studies.

### **Timeline of Proposed Research and Expected Short Term (1 yr) and longer Term (3-5 yrs) Outcomes**

Cultural management studies on fingerlings will be continued in 2010 to provide management guidelines for growers of these special type potatoes. At the end of the 2010 growing season, management guidelines will be documented for the three fingerling cultivars that are being entered in this project. The management guidelines that will be documented in 2010 will be a base for other fingerling cultivars in the longer term.

## ANNUAL BUDGET

### Personnel

Wages and fringe benefits for one non-student helper during the 2010 growing season	<b>\$8,000.00</b>
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### Materials and Supplies

Potato sacks, gloves, masks, sample paper bags, field stakes, and flags	<b>\$400.00</b>
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### Services

Soil, water, and petiole sample analysis	<b>\$1,600.00</b>
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<b>Total amount of this request</b>	<b><u>\$10,000.00</u></b>
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## BUDGET JUSTIFICATION

### Salaries and Wages:

Because of the extensive field and lab work involved in the studies proposed, including soil sampling, seed cutting, potato planting, in-season data collection (whole plant sampling, petiole sampling), and fertilizer application before and during the growing season, potato harvest, sizing and grading, data compilation and analysis, eight thousand dollars (\$8,000.00) is requested in this budget to supplement the wages and fringe benefits of one summer help.

### Materials and Supplies:

Field supplies include items such as field stakes, flags, sample paper bags, gloves, masks, and potato sacks for harvesting. Fertilizer will be purchased. Four hundred dollars (\$400.00) is requested for materials and supplies in this budget.

### Services:

Soil samples will be taken for each experimental plot before planting and after harvest. Petiole and whole plant samples will be taken at four different dates during the crop

growing season. Water samples will also be taken from the irrigation well. All samples collected will be sent to a soil, water, and plant nutrient analytical lab for analysis. One thousand and six hundred dollars (\$1,600.00) is being requested for the cost of sample analysis.