

Proposals for 2012-2013
Sastry Jayanty
Potato Postharvest Physiology
San Luis Valley Research Center, Department of Horticulture & LA

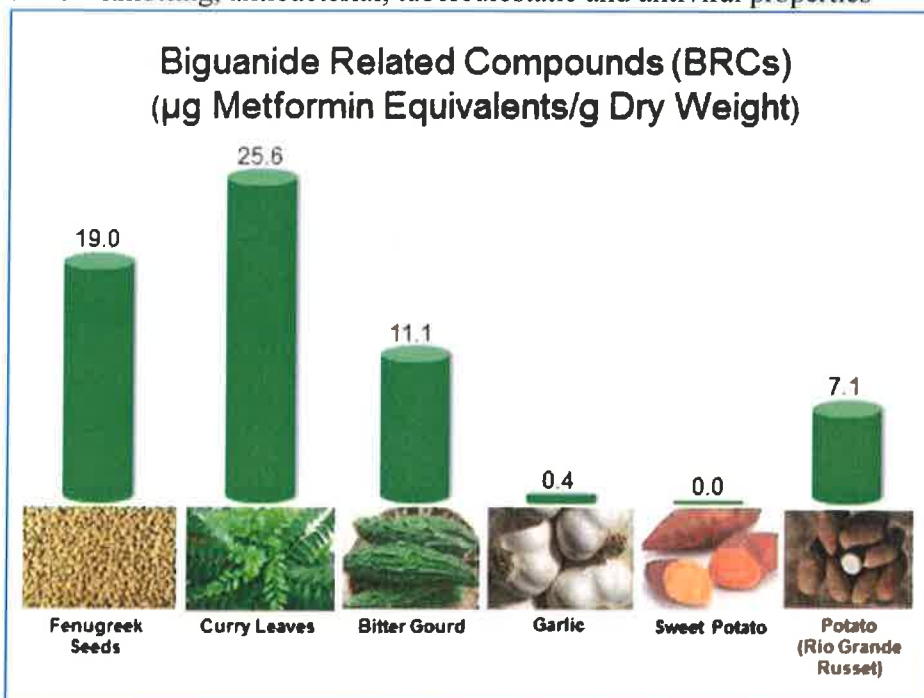
Funding Source: CCPGA Royalties

Title: Studying biguanide and related compounds in Colorado cultivars

Most relevant funding source: CCPGA royalties

Nature, scope, objectives of proposed research

Type-2 diabetes is the most common metabolic disorder worldwide, and its prevalence is growing at alarming rates in both developed and developing countries. Oral antidiabetic agents used to treat type-2 diabetes are commonly available on the drug market, including biguanides, sulfonylureas, thiazolidinediones, meglitinides, and α -glucosidase inhibitors (Mahajan & Gupta, 2010). Among biguanides, metformin (dimethylbiguanide), also known as 'glucophage', is the most widely prescribed drug used in the treatment of diabetes. The history of metformin can be traced back to the use of French lilac (goat's rue, Spanish sanfoin, or false indigo) as an herbal medicine in medieval Europe. French lilac is rich in guanidine, a substance with blood glucose-lowering (hypoglycemic) activity that is contained in the basic structure of metformin. Biguanides reduce hyperglycemia by increasing insulin sensitivity, decreasing glucose absorption, and inhibiting hepatic gluconeogenesis. Metformin is currently available on the drug market because of its unique mechanism of action, lower risk of lactic acidosis compared to that of phenformin, and its successful use in over 90 countries. In addition, biguanides are also used as antimalarial drugs. Furthermore, these compounds are known to have oral hypoglycemic, tumor-inhibiting, antibacterial, tuberculostatic and antiviral properties



There are about 800 plants that may possess potential anti-diabetic ingredients. Fenugreek, curry leaves, bitter gourd, garlic, and sweet potato are few among the 45 plants that have shown experimental or clinical anti-diabetic activity. Although fenugreek, curry leaves, bitter gourd,

garlic and sweet potato are known for antihyperglycemic properties in Ayurvedic medicine for several centuries; their active components remain to be identified. The concept of synthesizing biguanides, such as metformin, originated from the hypoglycemic properties of plant guanidines. However, there has been no report of plant biguanides. The objective of this study was to identify biguanide and related compounds (BRCs) in medicinal plant foods (fenugreek, curry leaves, bitter melon, garlic, and sweet potato) and potato tubers. The presence of antidiabetic compounds, such as flavonoids and polyphenols, in potato tubers encouraged us to include them in this study. Figure 1 describes the BRCs in the plant foods before and after correcting for common interfering compounds in assays.

Objectives

The objective of this study was to identify and quantify biguanide and related compounds (BRCs) in Colorado potato germplasm.

How the project will enhance the competitiveness of Colorado potato growers:

This research will enhance the value of our industry by increasing grower returns and open new markets

Extension-outreach plan for reporting project information to growers

Results will be presented and reported to grower community and scientific community using following avenues

- Rocky Mountain Ag conference,
- Northern Colorado Potato Grower meeting
- Potato Association of America Annual meetings
- Field days,
- Open house,
- Tours,
- Annual Reports
- Spuditem or newsletter.
- And site visits to commercial storages

Potential for results to leverage additional outside funding

This is one of the important research area identified by Specialty Crop Research Initiative grant advisory panel which includes nutritionists, dieticians, potato trade organizations, Chefs and processing, fresh market, growers and related industry.

Timeline and expected short term (1 yr) and longer term (3-5 yrs) outcomes

Funds are requested for two years.

Requested funding for (2 years) 2012-14: \$46 000.00

Year 1- \$24,000

Research Associate (50%):	\$15,000.00
Equipment and laboratory supplies:	\$4,000.00
Chemicals Supplies and Services:	\$5,000.00

Year 2-\$23,000

Research Associate (50%):	\$15,000.00
Equipment and laboratory supplies:	\$3,000.00
Chemicals Supplies and Services:	\$5,000.00