Food Crops for Health: Human Health Benefits of Traditional Native American Crops

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Epidemic of Diabetes in Indigenous Communities

• Nearly 400 million estimated indigenous population (5%) of the world face significant health disparities compared to their non-indigenous counterparts.

• More than 50% of indigenous adults over age group of 35 are suffering with type 2 diabetes (IDF, 2012).

• 2.2 times higher probability of American Indians and Alaska Natives to have diabetes compared to their non-Hispanic counterparts (American Diabetes Federation).
Food Security and Epidemic of NCDs

- Over Population, Food Security and NCD Epidemic
- Excess Calorie, Prevalence of NCDs
- Malnutrition and Food Security

- Food Desert and NCD epidemic in Native American Communities

- 29.1 million American have diabetes (9.3%)
- Total NCD mortality 36 million (63%)
- 347 million people have diabetes (WHO)
- 50% World Population

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Plant-based Food & Human Nutrition

- Food security is not based on calorie intake, but from the concept of balanced diet, enriched with micronutrients and phytochemicals.

- Interconnected and dynamic system

- Evolution & changes in Dietary Patterns & lifestyle

- Epigenetics & Metabolism of Food & Diseases

Previous Studies and the Foundation

1) Health Benefits of Traditional Corn, Beans, and Pumpkin: *In Vitro* Studies for Hyperglycemia and Hypertension Management
Y.-I. Kwon, E. Apostolidis, Y.-C. Kim, and K. Shetty
JOURNAL OF MEDICINAL FOOD 10 (2) 2007, 266–275

2) Evaluation of Indigenous Grains from the Peruvian Andean Region for Antidiabetes and Antihypertension Potential Using *In Vitro* Methods
Lena Galvez Ranilla, Emmanouil Apostolidis, Maria Ines Genovese, Franco Maria Lajolo, and Kalidas Shetty
J Med Food 12 (4) 2009, 704–713
Benefits of Traditional Food Crops

- Traditional cultivars shown better resistance against biotic and abiotic stresses
- Higher concentration of secondary metabolites with bioactive functionality
- Ecological and environmental sustainability
## Anti-diabetic Potential of Selected Traditional Crop Foods

<table>
<thead>
<tr>
<th>Crops</th>
<th>Total Phenolic Content (mg/g)</th>
<th>Total Antioxidant Activity (% inhibition)</th>
<th>Alpha-amylase Inhibition (%)</th>
<th>Alpha-glucosidase Inhibition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple Corn</td>
<td>8.0</td>
<td>77%</td>
<td>0%</td>
<td>51%</td>
</tr>
<tr>
<td>Quinoa</td>
<td>2.3</td>
<td>86%</td>
<td>0%</td>
<td>30%</td>
</tr>
<tr>
<td>Andean Legume</td>
<td>4.0</td>
<td>40%</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>Round orange pumpkin</td>
<td>0.17</td>
<td>33%</td>
<td>60%</td>
<td>50%</td>
</tr>
<tr>
<td>Jack Bean</td>
<td>1.2</td>
<td>22%</td>
<td>50%</td>
<td>20%</td>
</tr>
<tr>
<td>Dark red corn</td>
<td>0.5</td>
<td>38%</td>
<td>32%</td>
<td>35%</td>
</tr>
</tbody>
</table>
Strategies for Human Health Applications

Screening of food crops and cultivars for higher bioactive profiles in traditional food crops

Evaluation of bioactive functionality of screened food through *in vitro* assays for NCD management

Clinical and Epidemiological studies to prove the concept

Marketing, Outreach, and Education to develop the awareness for traditional healthy food

Sarkar and Shetty (2014) Ann. Rev. of Food Science and Technology
Future Challenges and Directions

• Distribution and accessibility of fresh, and healthy food.

• Food crop diversity with better ecological understanding.

• Knowledge on indigenous and traditional food system (cultivation, preparation, ingredients)

• Understanding food synergies and whole food profile.

• Solution with whole-system approach.

• Community based initiatives, education, awareness

• Prevention is better than cure...