

Evaluating the Suitability of Chickpea (*Cicer arietinum* L.) as a New Legume Crop to the Tropical Condition of Hawaii

Amjad A. Ahmad, Theodore J.K. Radovich, Hue V. Nguyen, Jensen Uyeda, Alton Arakaki, Cynthia Nazario Leary, Jari Sugano, Sharon Motomura, and Joshua Silva

Introduction:

The UN declared 2016 the international year of pulses. These crops require limited inputs (water and fertilizers), are nutritious and healthy, and they improve soil fertility. Also, they are important for crop diversity and sustainability in Hawaii. Chickpea is a highly nutritious grain legume crop and is one of the cheapest sources of protein (Ahmad, 2001). It can be eaten raw, roasted or boiled, processed into hummus, falafel, or flour (ICARDA, 2009). It contains none of the anti-nutritional or toxic compounds often present in other legumes. Chickpea grains contain 50-60% carbohydrates, 15-31% protein, and 6% fat. Also, chickpea is a good source of vitamins and minerals (ICRISAT, 2013). Chickpea is the second in area and third in production among the legumes worldwide (FAO 2014).



Chickpea plant growing at Poamoho location.

Chickpea is a very important crop for local trade in many tropical and subtropical regions, and is produced and consumed in large quantities in South East Asia, India, the Middle-East, and the Mediterranean regions. Through a symbiotic nitrogen fixation relationship, chickpea meets up to 80% of the soil's nitrogen needs, which can enhance soil fertility and reduce the need for fertilizer application (ICARDA, 2009). The main objective of this project is to evaluate growth and yield of chickpea varieties to the micro-climates in Hawaii.

Varieties, Locations, and Sowing Date:

In order to test the suitability of chickpea to the micro-climate conditions in Hawaii. Different varieties, locations, and sowing dates were tested:

Varieties: We were able to obtain 10 varieties (From: online market, Montana State University, and the Agricultural Research Service-USDA) and 25 genotypes (from the National Plant Germplasm System-ARS-USDA).



10 chickpea varieties used in the field trials

Locations: We selected 6 locations on the main five Hawaiian Islands: Poamoho-Oahu, Kahului and Kula Ag Park-Maui, Mealani-Big Island, Kapaa-Kauai, and Hoolehua-Molokai.

Sowing Date: Due to the big number of locations covered, we were not able to plant all locations on the same planting dates. However, in general the planting dates were: Dec, Feb, March, and May.



Kula Ag Park site: Chickpea varieties planted at different sowing dates.

Planting and Harvesting:

At all locations and sowing dates, varieties were planted in rows (1 ft between rows and 3 inches between plants) with drip irrigation. Fertilizer was applied once at planting and weeding was performed at each location based on the need. Dec. and Jan. plantings were harvested in early/late April, Feb/March plantings are expected to be harvested in June, and April/May plantings are expected to be harvested in July/August, respectively. Since it's the first year of the project, harvest was done manually, by collecting the pods from each plant. However, we are working on setting up trials for mechanical harvest.



Chickpea pods (Dec. Planting) harvested in April from Hoolahua-Molokai.

Chickpea Diseases/Pests:

The most common diseases and pests are:

Ascochyta blight and Fusarium Wilt (Fungus)

Mealy bugs and Pod borers (Insect)

Root-knot nematodes

Seeking Farmers Participant:

The project team would like to invite local farmers, especially in areas with low rainfall, to participate in the project and grow chickpea. The project team will provide chickpea seeds (different varieties) and fertilizers. Please email: alobady@hawaii.edu if you are interested.

REFERENCES:

Ahmad, A.A. 2001. Effect of date of sowing and plant population on growth and yield of Chickpea (*Cicer arietinum* L) varieties in Northern Iraq. Master Thesis, College of Agriculture and Forestry, Mosul University.

FAO. 2014. The State of Food and Agriculture. Innovation in Family Farming. Annual Report. Food and Agriculture Organization of the United Nation.

ICARDA. 2009. Project 4: Food legume improvement in: Medium-term plan 2010–2012, pp. 98–128.

ICRISAT. 2013. Inclusiveness for a prosperous and food secure drylands. International Crops Research Institute for the Semi-Arid Tropics. Annual Report.

Acknowledgment:

The project team would like to acknowledge the help from the crew members at the research stations on different islands. The project is funded by Hawaii Department of Agriculture (HDOA).