

THE UNIVERSITY OF TRINIDAD AND TOBAGO

CAPSAICIN PRODUCTION FOR PHARMACEUTICAL USE

Puran Bridgemohan

Bio-sciences, Agriculture and Food Technology, The University of Trinidad and Tobago, Waterloo Research Centre, Carapichaima, Trinidad, Email: puran.bridgemohan@utt.edu.tt





Fig 1, Green House Production Carvahlo Hot Selection



Fig 2. Mature Carvahlo Hot Selection fruits for Capsaicin Extraction



Fig 3. Extraction Apparatus



Fig 4. Alcohol vs Acetone Extraction

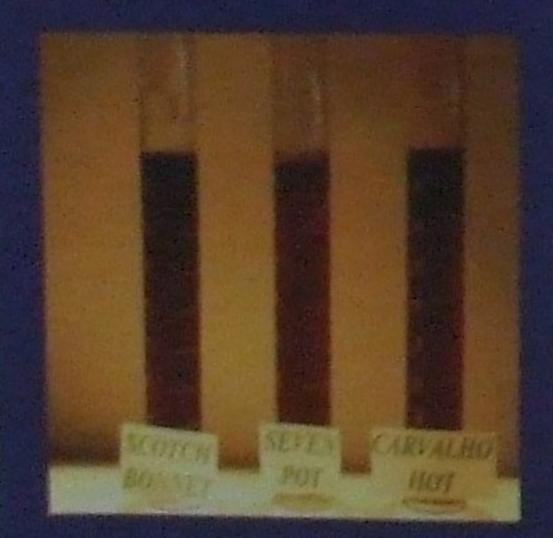


Fig 5. Fixed all yield of Hot Pepper Selection



Fig 6. Fruit of Carvahlo Hot Selection

INTRODUCTION

Capsaicinoids (8-methyl-N-vanillyl-1-6-nonemaide) significant pharmaceutical and non-lethal force potential (Nelson, 1919). It is used in topical ointments to relieve pain of peripheral neuropathy at low concentrations [0.025 to 0.075%], as a treatment in apoptosis of prostate cancer cell, and is being tested for the prevention of pain post surgery (Anon, 2008). Capsaicin is the main capsaicinoids in hot peppers [capsicum chinense and C. annuum]. Previous research was focused on the culinary and food value of hot peppers which are the major source of capsaicin (Mc Gaw and Holder, 2002). Whilst most of the varieties / landraces cultivated are considered 'hot' based on the Scoville Unit [SU] test e.g. scotch bonnet (300,000SU), seven pots (750,000SU), and Scorpion, (>1,000,000SU) [Umaharan et al.; 2002], little effort was pursued in producing varieties for high oil yield. This study evaluates crop phenology, agronomic performance of a "newly discovered" pepper selection - the 'Carvahlo hot' and compares its Fixed Oil [Capsaicinoids] yield with 2 local landraces ['Scotch | bonnet', and '7-pots'] hot peppers in Trinidad.

MATERIALS AND METHOD

The crop was cultivated under green house conditions [50% sunlight & drip irrigation], in mixture of peat moss and perlite in containers [0.70m³]. The plants were 'fertigated' daily [2.0kg.ha¹ 1.200 / of water] with a N.P.K. nutrient mix [9:18:36 + 0.5MgO + Trace elements]. The pest and disease were controlled using a judicious spray program of Oberon 24 SC* and Consento 45 SC* at weekly intervals. The ripe peppers were harvested, chopped and air–dried for 72hrs at room temperature. The extraction method used was the solvent extraction technique using both ethanol and acetone as described by Krishna (2004).

RESULTS AND DISCUSSION

'Carvahlo hot' selection growth and yield performance are presented in Table 1 and the yield component analysis for the 3 landraces in Table 2. The results indicated that selection 'Carvahlo hot' fruits had the highest fixed oil yield [9.0ml/100g] compared to the other 2 landraces. The Fixed Oil content is a complex of all the capsaicinoids capsaicin, homo-, dihydro-, nordihydro- and homodihydro-capsaicins, including all other aromatic compounds. 'Carvahio hot' has the potential to produce approximately 2.5 times more than the highest pepper-oil yield in the Caribbean as reported by Mc Gaw and Holder [2002] (4.15 to 5.05g at 450bar) using SFE and Gibbs and O'Garro [2004] (37.6 to 497mg/100g) using HPLC). The results suggest that based on the Scoville Units estimates [>1,000,000] and the fixed oil yield that the 'Carvahlo hot' selection may be hotter than the infamous 'Scorpion pepper' and a potential crop to be considered for capsaicinoids production for pharmaceutical use.

Service Committee Committee
value
40
64
120
4.5
13 -21
126
6.2

Table 1. showing Crop phenology and mature fruit of 'Carvahlo Hot'.

Characteristics	Cultivars/landraces		
	Scotch Bonnet	Seven	'Carvahlo
Length [cm]	3.1	2.9	2.1
Width [cm]	2.7	2.6	2.8
Nos. Lobules	3-4	4	3
Nos. Seed.fruit-1	118	72	69
Placenta wt [g]	0.34	0.41	0.9
Skin thickness [mm]	1	1	2
Colour	yellow	red	red
Skin description	smooth	rough	Very rough
Oil yield.100g-1	3.5	5.0	9.0

Table 2. Yield Component of 3 landraces of hot pepper.

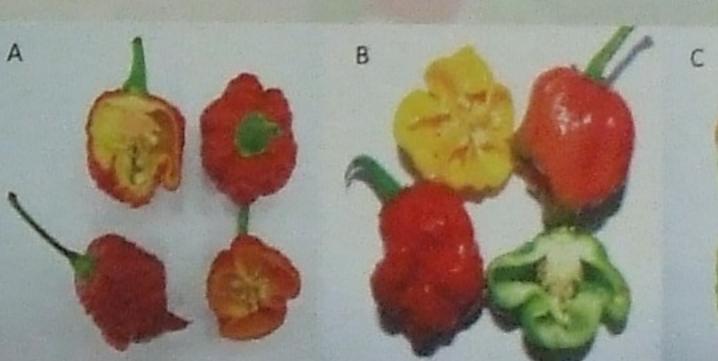




Fig 7. Morphological Structures of (A) Carvahlo Hot, (B) Scotch Bannet and, (C) Seven
Pot Hot Pepper Landraces.

ACKNOWLEDGEMENTS

The Author recognizes the support and contribution of WB. Ian Carvahlo, for selecting and making available the planting material for the study, D. Kidney and S. Khan for laboratory support and the research team [Robin, Jaikaran, Besson, & Abigail] at the WRC-UTT for the cultivation and care of the crop. This presentation was supported by the Technical Centre for Agricultural and Rural Co-operation ACP-EU, P.O. Box 380 / 6700

BIBLIOGRAPHY

AJ Wageningen / The Netherlands Website: www.cta.int

*Adams, A. & Mohammed, K. [2008] A catalogue of the commercial hot pepper landraces of Trinidad and Tobago. CARDI Publication, PSC#TT/001/08.

*Anon. [2006]. Pepper component hot enough to trigger suicide in prostate cancer cells. American Assoc. for cancer Research. www.eurekalert.org/pub-
*Anon. [2008]. Chilli pepper cocktail blunts pain: Scientific American.

(http://www.sciam.com/article).

*Krishna, D.A. (2004). Capsicum: The genus Capsicum (Medicinal and Aromatic PlantsIndustrial Profiles). London: Taylor & Francis, 3: 65; 6.5: 109.

*Gibbs, H.A.A & O'Garro, L.W. [2004]. Capsaicin content of West Indies hot pepper cultivars using colorimetric and chromatographic techniques. HortScience, 39: (1) 132-135.

*Nelson, E.K. [1919]. The constitution of capsaicin, the pungent principle of capsicum. J. Am. Chem.Soc; 41:1115-1221.

•McGaw, D.R & Holder, R. (2002). Processing Potential of hot peppers (capsicum annuum L.). www.cardi.org/pub/proc/hotpepper/4.2.html.

*Umaharan,P.,Adams, H., Moses,M. (23002). Caribbean Hot pepper germplasm management. www.cardi.org/pub/proc/hotpepper/4.2.html.

Poster and Paper Presented at the 46° Annual Meeting of the Cartifican Food Crops Society, Centro para el Desarrollo Agropecuario y Forestal, July

12 to 17° 2010 Hotel Osacis, remaca, Boca Chica, Dominican Republica.