

CAPSAICIN PRODUCTION FOR PHARMACEUTICAL USE

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INTRODUCTION

Capsaicinoids (**8-methyl-N-vanillyl-1-6-nonamide**) have 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. annum*]. 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.ha⁻¹.200 l 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. 'Carvahlo 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.

Characteristics	value
50% Flowering [dat]	40
50% fruiting [dat]	64
Length of 1 st harvest period "	120
% fruit set	4.5
Nos. fruit. tree ⁻¹	13 -21
Yield .tree ⁻¹ [g]	126
Fruit weight [g]	6.2

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



Characteristics	Cultivars/landraces		
	Scotch Bonnet	Seven Pot	'Carvahlo Hot'
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 Bonnet and, (C) Seven Pot Hot Pepper Landraces.

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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 oil yield of Hot Pepper Selection



Fig 6. Fruit of Carvahlo Hot Selection