

STUDIES ON THE MANUFACTURING OF
GREEN PEPPER (*Piper nigrum*) PICKLES AND
GREEN PEPPER SAUCE.

by

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DECLARATION

I do hereby declare that the work reported in this thesis was carried out at the University of Sri Jayewardenepura, under the supervision of Prof. Arthur Bamunuarachchi and no part of this thesis has been submitted earlier or concurrently for the same or any other degree.

A handwritten signature in blue ink, appearing to read 'H.N.I. Perera', with a long horizontal flourish extending to the right.

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I certify that the above statement made by the candidate is true and this thesis is suitable for submission to University for evaluation.

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To my loving parents, sisters and husband for corporation, help,

And guidance extended.

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ABSTRACT

Black pepper (*Piper nigrum* Linn) is one of the most important spices in Sri-Lanka, fetching valuable foreign exchange to the country. Due to the cut – throat competition in the world market for black pepper, it is necessary to diversify our exports in other forms like pickled Green pepper and Green pepper sauces.

The green pepper cultivar used in this study was *Ceylon*. Studies were undertaken to identify the optimum stage of maturity to harvest the green pepper for pickling.

The green pepper spikes at different maturity levels were submerged in solutions of different concentrations of salt, acetic acid, citric acid and lactic acid solutions. The optimum maturity level was determined with special reference to color of the spikes and color of filling liquid.

It was identified; five to six month mature spikes could be preserved without difficulty with compare to other maturity levels.

Color, taste, and acceptability of seven pickle samples were analyzed by fifteen judges on five point hedonic scale.

The highest average scores in color and acceptability during the whole process were recorded by the green pepper pickled in 2% brine + 2 – 3% acetic acid and 0.5% Citric acid.

Green pepper pickled in 2% brine + 2-3% acetic acid showed the highest score in taste.

The green pepper sauce was prepared by using green pepper pulp and undergoing traditional sauce making recipe. The overall acceptance of the sauce sample was analyzed by fifteen people by a general questionnaire. The product was highly accepted by the judges with special reference to color and taste of the product.

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CHAPTER 1 INTRODUCTION

Black pepper (*Piper nigrum* Linn) is one of the most important spices of genus *Piper* of the family Piperaceae. Pepper is an indispensable item in the food industry. It has subsidiary use in medicine and has been reported to have insecticide property.

Due to the cut throat competition in the world market for black pepper, it is necessary to diversify our export of black pepper in to value added products like processed green pepper, green pepper pickles, green pepper based sauces etc.

Pepper appears to have originated on the west coast of south India and spread to the east, eventually reaching the Malay Penninsula. Sri Lanka therefore was probably one of the earliest locations of this spice.

Pepper is largely grown in Matale, Kandy, Kegalle, Kurunegala, and Nuwara Eliya Districts. Pepper in Sri Lanka is rarely cultivated in pure stands – mixed cropping and inter – cropping are a routine feature. Therefore assessing potential yields area wise is difficult.

Pepper begins to yield within 4 years of planting. Selected cultivars may even start bearing in the second year.

There are two major pepper harvest in Sri Lanka – a major one in October-January which produce the two third of the annul yield. A minor yield produces during June – July.

Pepper is mature and ready for harvest 7.5 to 8.0 months after flowering, however in Sri Lanka immature harvesting is commonly practiced to prevent the losses due to pilferage.

This practice has enormous significance as maturity at harvest dictates the end production.

On the other hand, immature berries are reported to be the best starting material for oil and oleoresin extraction. The optimum maturity plays a key role in the production of new

pepper products like green pepper products, buff pepper and pericarp containing white pepper.

According to Export Development Board's, Export performance indicators, Sri Lanka has exported 4854 tonnes of black pepper with value of 1587 million rupees during the year of 2000. In 2003 it has exported 7859 tonnes of black pepper with the value of 1261 million rupees. Sri Lanka export about 2-3% value added products of black pepper including white pepper, pepper oleoresin, dehydrated green pepper and buff pepper. If Sri Lanka starts to export processed green pepper products it can fetches 10 – 12 times the price of black pepper. That is a new promising line for diversification of our exports of pepper.

Green pepper is used mostly in Western cooking, where it often goes into mustard or bottled condiments. It is the pepper to use for pepper steak and several sauces to accompany broiled or fried meats. Pickled green peppercorns are often used as a spicy garnish to cold foods. This makes them useful for delicate dishes for which the heavy pungency of black pepper would be disastrous.

The objective of this study is to develop a method for commercial scale production of Green pepper based products. The cultivar used in this study is *Ceylon*.

The first part was aimed to find out a best methodology for pickling of green pepper with special attention on color stability of the product. The second part was aimed to developing a sauce by green pepper paste.

CHAPTER 2

LITERATURE SURVEY

Bot name : Black Pepper ; *Piper nigrum* Linn.

White Pepper ; *Piper nigrum* Linn.

Green Pepper ; *Piper nigrum* Linn.

Family : *Piperaceae*

Sinhala : Gammiris

Hindi : Kali Mirch

2.1 Description of the Plant

Piper nigrum L. a perennial woody evergreen climber, native to the evergreen forests of the western Ghats of South India. Under cultivation pepper vines are trailed over supports- either living trees or other supports, as columns 5-6m tall and 1.0 –2.0m in diameter. The climbing woody –stems have swollen nodes having clinging roots at each node, which helps in anchoring the vine to the support trees. Pepper plants exhibit dimorphic branching, having two different types of branches; the straight upward growing (monopodial) main stem and orthotropic shoot climbing and remaining vegetative, adhering to the support with short adventitious roots and nodes. From the axils of leaves of orthotropic shoots, lateral shoots grow, and they have a sympodial habit of growth, having shorter inter nodes and without adventitious roots. In such branches , as the growth proceeds, the terminal buds gets modified into an inflorescence(spike) and further growth is continued by the axillary bud.

(P. N. Ravindran and Johny , Indian Institute of Spices Research, Kerala)

Spikes vary in length in cultivars, being 3-15cm long with 50-150 flowers. The flowers are very minute, white to pale yellow in color arranged spirally on fleshy peduncles. The species is self-pollinated, and pollinated by geitonogamy. The dispersal of pollen is aided by the presence of water droplets.

The fruit is a single seeded drupe, but is often called a berry, sessile, usually globular, having fleshy pericarp and hard endocarp. Fruits are green on young and changing to red when ripening.

2.2 Cultivars and varieties.

The cultivars of black pepper have originated from the wild types. More than hundred of cultivars are known and a few of them are still popular (Ravindran et al 2000). The traditional pepper growing tracts have their own popular cultivars. Cultivar diversity is richest in the state of Kerala . the important popular cultivars in India and other countries are given in table 2.1 .

Table 2.1 - The popular cultivars in pepper producing countries.

India	Arrakulam, Munda, Blankotta, Karimunda, Kottandan, Improved varieties : Panniyur 1,2,3,4,5,6 and 7 . Sreekara, Subhakara, Panchami
Brazil	Kuching, (Singapura), Panniyur 1
Malaysia	Kuching, Sarikei, Miri
Indonesia	Bangka, Banjarmasin, Belatung, Beng Kayang, chunuk ,
Sri Lanka	Ceylon
Madagaskar	Sel IV 1, Sel IV 2
Thailand	Antique, Ban keow, Prang thi