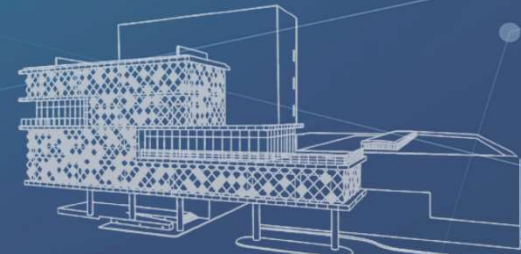




หน่วยทันตกรรมพระราชทาน
ในพระบาทสมเด็จพระเจ้าอยู่หัว

DENTAL INNOVATION FOUNDATION UNDER ROYAL PATRONAGE



SPEAKER



Associate Professor Dr.

**SORNKANOK
VIMOLMANGKANG**

Head of the Department of Pharmacognosy and
Pharmaceutical Botany, Faculty of Pharmaceutical Science, Chulalongkorn
University



Assistant Professor Dr.

**PAIBOON
JITPRASERTWONG**

Institute of Dentistry,
Suranaree University of Technology
Ananda Mahidol Scholarship(Dentistry Division on 2007)

OUTLINE

1

OVERVIEW

of

DENTAL INNOVATION FOUNDATION
UNDER ROYAL PATRONAGE



2

VETIVER

with

DENTAL RESEARCH



3

CLINICAL TRIAL

of

VETIVER MOUTHWASH





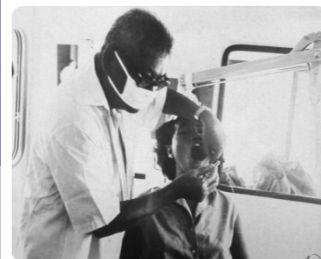
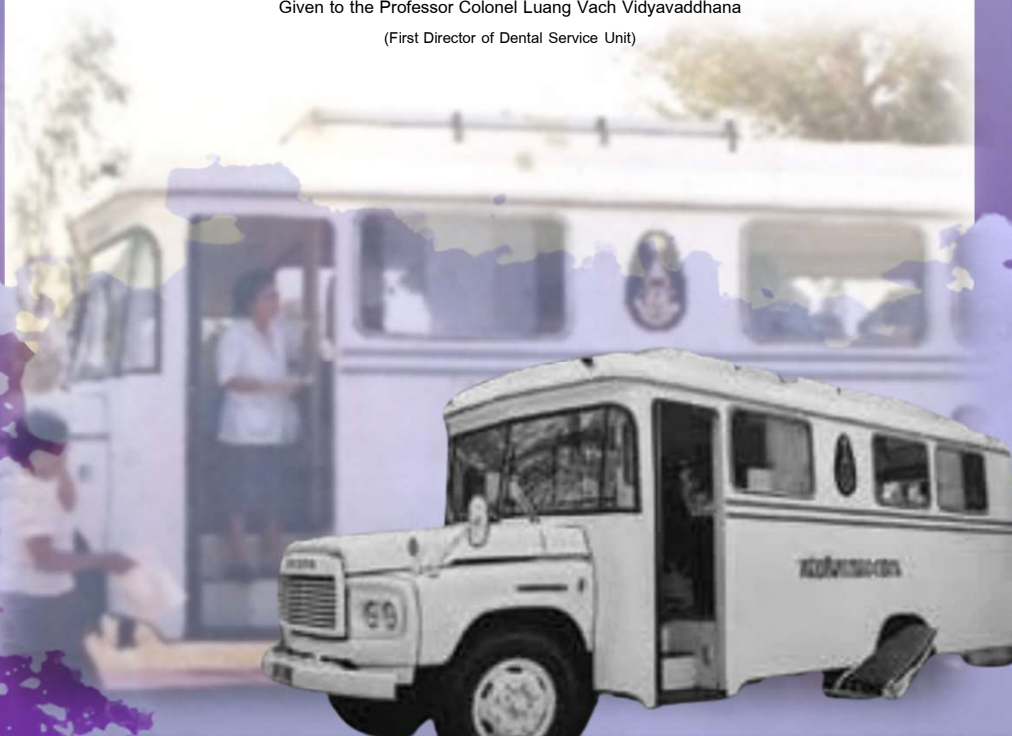
1970

19th April

First Time of Dental Service in Thailand
at Thap-sakae, Prachuap Khiri Khan

***“When he had problems with his teeth,
dentists take care of it and the people who are far away.
Will there be a dentist to treat them”***

His Majesty King Bhumibol Adulyadej the Great's Speech
Given to the Professor Colonel Luang Vach Vidyavaddhana
(First Director of Dental Service Unit)



Regional Dental Service Unit (7 University & 1 Hospital)



Northern



Southern



Central and Eastern



Northeast



โรงพยาบาลราชวิถี





2009

11st November

Distribute Dental Innovation Foundation
under Royal Patronage Head office at
Rama 9, Wangthonglang, Bangkok



HALAL



HAL-Q



FSSC22000



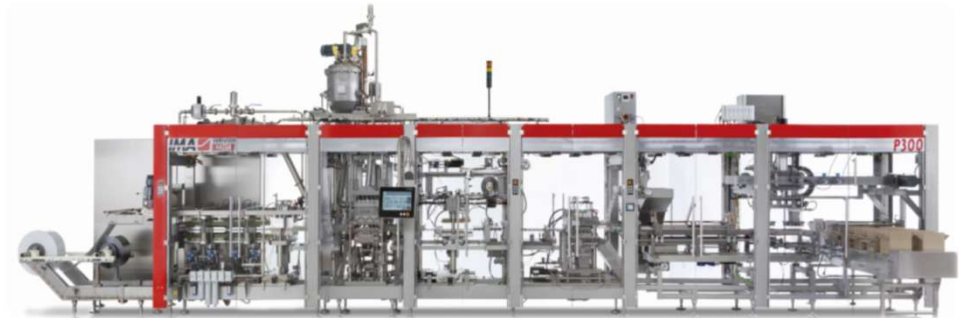
ISO22000



HACCP



GMP



Medical Food Factory



Medical Devices Factory



Dental Clinic



Lady Budtree Weerawaitayaa
(Board of Consultant)



Special Professor Dentist
Lady Petchara Techakampuch
(Chairman)



MR. Worawut Kulkaew
(Secretary General)

VISION

“ Being an organization supporting the work of H.M. the King’s Dental Service Unit by cooperating with other network units, and providing opportunities for people to receive the benefits from dental research and development invented in the country.”

MISSION

1. Disseminate His highness’s kindness to the Thai people on dental public health.
2. Conduct research and development of dental products to meet international standards in order to solve dental public health problems effectively.
3. Support dental services by cooperating with other network units, using innovative products produced within the country.
4. Develop the organization to maximize its potential to produce innovative products continuously and sustainability.

ORGANIZATIONAL UNITS

1

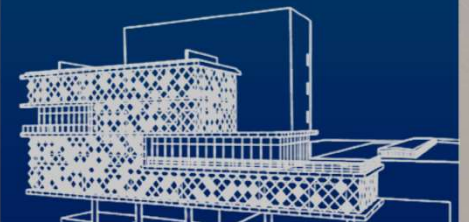
Administration Department

2

Operation Department

3

DIF Research and Development Institute of Medical Industry (DRI)





DRI

DIF
Research and Development
Institute of Medical Industry

SERVICE

Dental Clinic and
Development Service Center



DENTAL CLINIC

1. Rama 9 (Bangkok)
2. Khlong Luang (Pathum Thani)

WELFARE

Project Management and
Special Activities Center



TRAINING CENTER

RESEARCH AND DEVELOPMENT

King's Rama 9 Dental Implant
Development Center



TECHNOLOGY TRANSFER



MEDICAL DEVICES

King's Rama 9 Medical Food and
Pharmaceutical Development Center



MEDICAL FOOD



PHARMACEUTICAL

METHALLIC GROUP



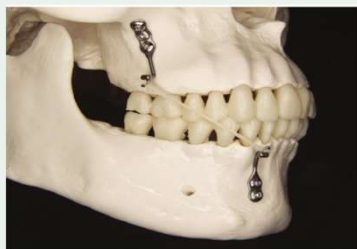
- DI**
Dental Implant
- Generation 1 – Fun Yim
 - Generation 2 – Gen 2
 - Generation 3 – PRK
 - Generation 4 – PRKP, 5 DEC



- HP&S**
Human Plate and Screw
- Human plates and screws for the fixation of head and facial fractures for humans.



- CFI**
Craniofacial Implant
- Implant for facial prosthesis are use for adhesion of the ear eye, nose, *etc.*

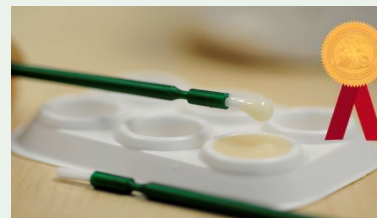


- BAMP**
Bone-Anchored Maxillary Protraction
- Orthopedic fixation material to modify the jawbone. It is used to treat patients with cleft lip and cleft palate.

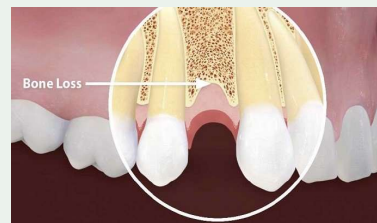
BIOMATERIAL GROUP



- RPS**
Resin Pit and fissure Sealant
- Dental sealant for people with deep grooves in teeth.

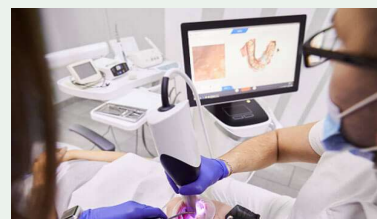


- FLV**
Fluoride Varnish
- Fluoride Vanish to reduce dentin hypersensitivity.



- BF**
Bone Filler
- Replace the missing alveolar bone and prepare the bone for implantation. Using synthetic bone to replace the alveolar bone before the installation of the implant.

DIGITAL DENTISTRY GROUP



- IOS**
Intra Oral Scanner
- An intra oral scanner used to directly create digital impression data of the oral cavity. Product for dental implant screening.

FINISHED PRODUCT

FDA & HALAL
CERTIFICATED

OMJ / JELLY
Oral Moisturizing Jelly



- Honey Lemon Flavor
- Strawberry Flavor
- Lychee Flavor

Nutri Jelly / AOF
Anti Oral Cancer Food



- Mango Flavor
- Passion Fruit Flavor
- Mangosteen Flavor

BBF
Baby Food



- Mango, Passion Fruit and Banana
- Purple Sweet Potato, Sweet Corn and Pumpkin

NCDs Food
AOF for
Non communicable
Diseases patient



- Kidney Disease Food – Soybean, Mango Flavor (Low P and K)
- Diabetes Disease Food - Mango Flavor
- Alzheimer Food - Mango Flavor
- Ketogenic food - Mango Flavor

ON PROCESS TO DEVELOPMENT

- Honey lemon Flavor and *Centella asiatica* Extract
- Mango Flavor and Mangosteen Peel Extract

- Mango Flavor and PEITC (on the process FDA filing)
(PEITC : β -Phenethyl isothiocyanate (PEITC) is present in many cruciferous vegetables with remarkable anti-cancer effects.)

FINISHED PRODUCT

FDA CERTIFICATED

MOUTHWASH

Doi Tung Vetiver Refreshing Mouthwash



First product of oral care product
group from Dental Innovation
Foundation under Royal Patronage
developed form
vetiver root extract

ON PROCESS TO DEVELOPMENT

MOUTHWASH
Alcohol free

MOUTHWASH
Alcohol free and Fluoride

MOUTHWASH
Herbal for Increased Wound healing

TOOTHPASTE
Fluoride Toothpaste

TOOTHPASTE
Sensitive Prevent and Repair

MOUTH SPRAY
Refreshing Mouth Spray

CONSUMER PRODUCT
(Shampoo, Handwash, etc.)

PASTE FOR WOUND HEALING

VETIVER DYE



OUTLINE

1

OVERVIEW

DENTAL INNOVATION FOUNDATION
UNDER ROYAL PATRONAGE



2

VETIVER

with

DENTAL RESEARCH



3

CLINICAL TRIAL

VETIVER MOUTHWASH





“Vetiver grass can be used for many things.

Dentists try to think about what the benefits of dental work are and tell me about it.”

His Majesty King Bhumibol Adulyadej the Great's Speech
 Given to the Special Professor Dentist Lady Petchara Techakampuch
 (Chairman of the Dental Innovation Foundation under Royal Patronage)

“ Ya Faek Sustainable Economic and Dental Application ”



Research by Faculty of Dentistry and
 Faculty of Pharmaceutical Science Chiang Mai University,
 2003-2004

PROJECT 1

Pharmacognostic Identification,
 Antimicrobial, Anticancer activities of
 Various Cultivars of Ya Faek.

PROJECT 2

Possibility of Using the Extract from
 Ya Faek for Inhibiting Periodontal
 Pathogen Isolated from Oral Cavities
 of Periodontitis Patients.

PROJECT 3

Studies on *in vitro* Cytotoxicity,
 Bacterial Mutagenicity, and *in vivo*
 Toxicity Properties of Antimicrobial
 Extracts of Ya Faek.

PROJECT 4

The Development of Pharmaceutical
 Product from Ya Faek Extract for
 Treatment of Periodontal Disease.

Result of this study showed the *Vetiveria zizanioides* extract has potent to the antimicrobial activity especially the periodontal pathogenic bacteria. The further results of the toxicity test showed that the extract from these cultivars were not toxic to both tested cell culture and animal models.

MOU

MEMORANDUM OF UNDERSTANDING FOR RESEARCH AND DEVELOPMENT

VETIVER GRASS – PRODUCTS – EFFECTIVENESS



VETIVER GRASS SUPPORTER

M.L. Dispanadda Diskul

Director of Mae Fah Luang Foundation under Royal Patronage

MR. Theerapan Tothirakul

Senior Manager of Plant Research and Development
Doi Tung Development Project
Mae Fah Luang Foundation under Royal Patronage



VETIVER EXTRACT, IDENTIFICATION

& PRODUCT CONSULTING

Assoc. Prof. Somkanok Vimolmangkang, Ph.D

Department of Pharmacognosy and Pharmaceutical Botany
Faculty of Pharmaceutical Science, Chulalongkorn University

Assoc. Prof. Jittima Luckanagul, Ph.D

Department of Pharmaceutics and Industrial Pharmacy
Faculty of Pharmaceutical Science, Chulalongkorn University



CLINICAL TRIAL



Assist. Prof. Paiboon Jitprasertwong, Ph.D

Institute of Dentistry, Suranaree University of Technology

Assoc. Prof. Anuphan Sittichokechaiwut, Ph.D

Faculty of Dentistry, Naresuan University

Suriyant Thammarat, DDS

School of Dentistry, University of Payao

Assoc. Prof. Orapin Komin, Ph.D

Faculty of Dentistry, Chulalongkorn University



MAE FAH LUANG FOUNDATION
UNDER ROYAL PATRONAGE



MR. THEERAPAN TOTHIRAKUL (Noi)

Senior Manager of Plant Research and Development
Doi Tung Development Project



CULTIVATION AREA

Doi Tung Development Project, Mae Fah Luang Distric, Chiang Rai, Thailand

Division

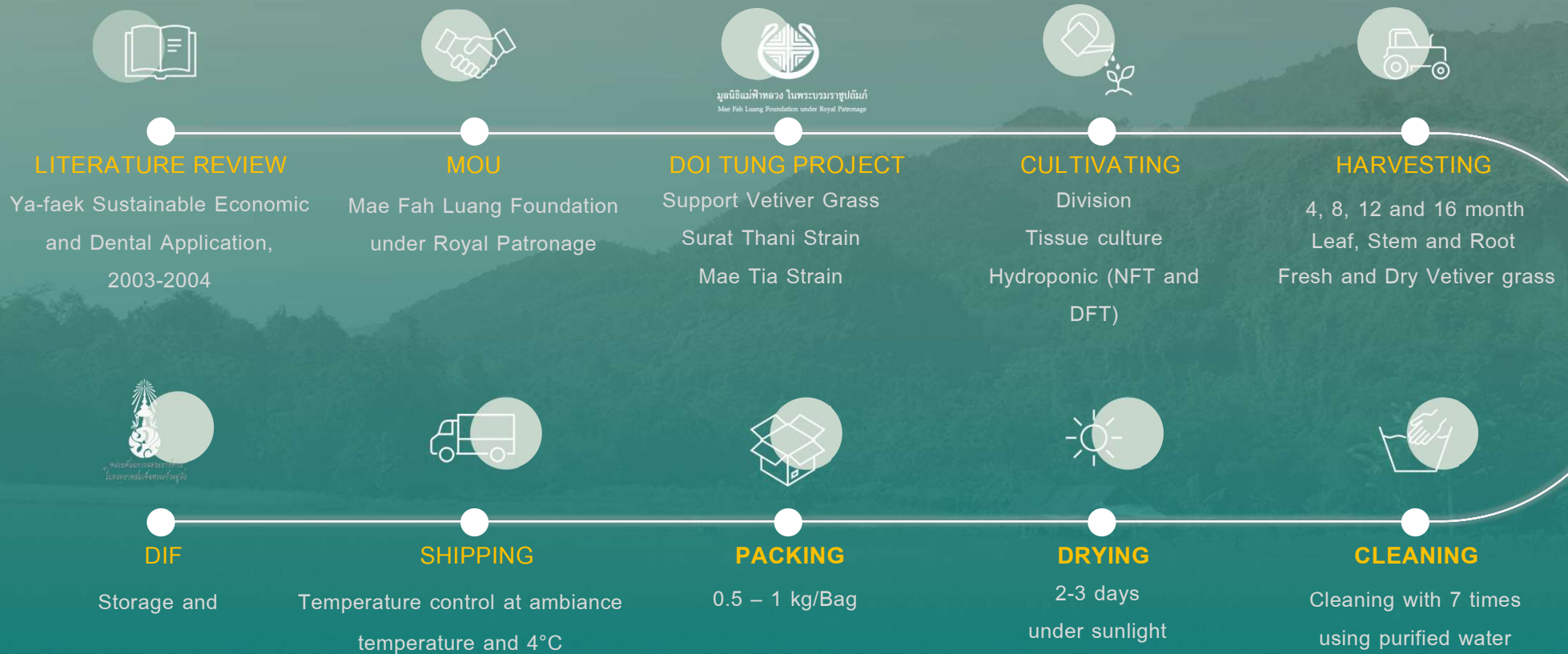
Tissue Culture



Nutrient Film Technique (NFT)

Deep Flow Technique (DFT)

VETIVER GRASS FROM FARM TO LABORATORY





Nutrient Film
Technique (NFT)

Deep Floating
Technique (DFT)

Division

Tissue culture



Leaf



Stem



Root



Fresh root



Dry root

REQUIREMENT OF RAW MATERIAL

STRAIN

- Surat Thani
- Mae Tia

HARVEST TIME

- 4 Month
- 8 Month
- 12 Month
- 16 Month

CULTIVATING

- Hydroponics (NFT)
- Hydroponics (DFT)
- Division
- Tissue Culture

PART

- Root
- Stem
- Leaf

TYPE OF RAW MATERIAL

- Fresh Grass
- Dry Grass



VETIVER GRASS

Botanical name : *Chrysopogon zizanioides* (L.) Roberty
 Synonym : *Vetiveria zizanioides* (L.) Nash
 Kingdom : Plantae
 Phylum : Magnoliophyta (Flowering plant)
 Class : Liliopsida (Monocotyledon)
 Order : Cyperales
 Family : Poaceae (Grass family)
 Genus : *Vetiveria bory*, *Chrysopogon*



- 1998** : Antimicrobial Activity of *Vetiveria zizanioides* Nash root
 Khesorn *et al.* Results of crude methanolic extract showed antimicrobial activity against *S.aureus*, *E.coli*, *P.aeruginosa*, *K. pneumoniae*, *C. albicans*, *A. Flavus*, *T. mentagrophytes*, and *M. gypseum* at 10% using Minimum Inhibitory Concentration(MIC) Method.
- 2003-2004** : Ya Faek Sustainable Economic and Dental Application.
 Chiangmai U. Results showed the *Vetiveria zizanioides* extract has potent to the antimicrobial activity especially the periodontal pathogenic bacteria.
- 2010** : Antimicrobial Activity of Alkaloid from Roots of *Vetiveria zizanioides* (L.) Nash ex Small.
 Khesorn *et al.* Results Root of *V. zizanioides* (L.) Nash ex Small cultivar Surat Thani showed antimicrobial activity especially **vetiverin**. However, antimicrobial activity of *V. zizanioides* was more likely a result of the additive or synergistic effect of several compounds.

VETIVER EXTRACT

THREE EXTRACTION

ETHANOL METHODS

Steam Distillation



Yield

0.042%

- Low extraction yield
- Specific for volatile Compound or Oils
- Some chemical compound denature by heat



Yield

10.00%

- High extraction yield
- Specific for Non-volatile and less volatile compound)
- Easy to use after extraction
- Ethanol elimination using rotary evaporator
- long time extraction

Supercritical CO₂



Yield

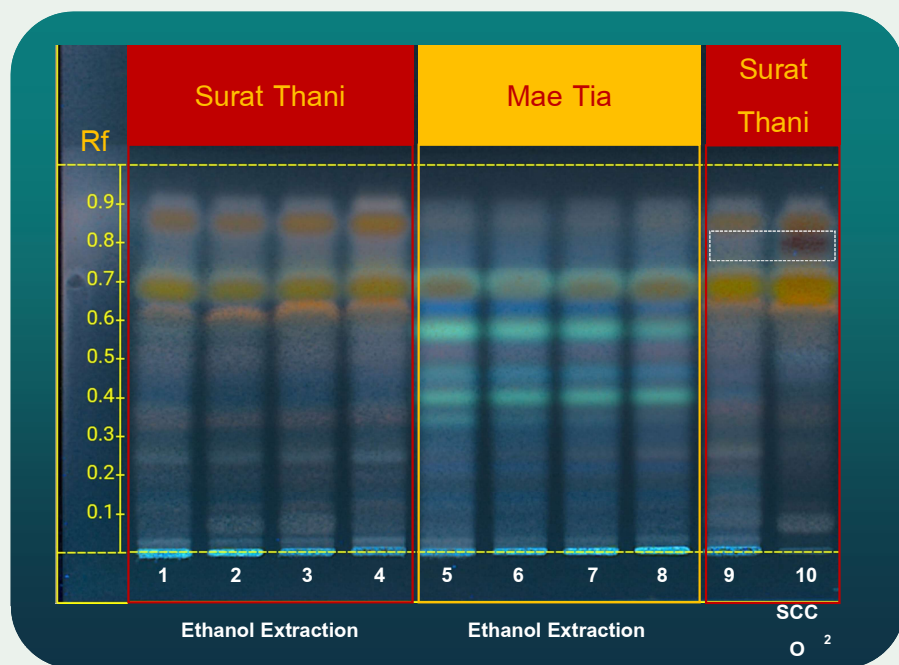
3.30%

- Low extraction yield
- Specific for Non-volatile compound
- Environment friendly
- High extraction cost

Vetiver Root extracted using ethanol extraction method,
That high extraction yield, low cost and easy to eliminate Extraction
solvent (Ethanol) from Vetiver Extracted

High-Performance Thin Layer Chromatography : HPTLC

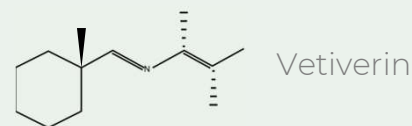
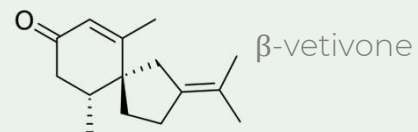
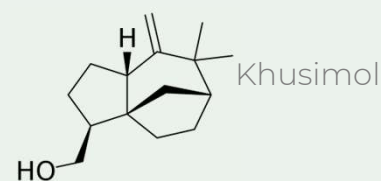
Technique for separate chemical composition of extracted using like dissolve like properties between vetiver grass extracted and solvent.



PHYTOCHEMICALS



Anti-Oxidant
Anti-Microbial
Anti-Inflammatory
Anti-cancer



Analysis of Heavy Metal Content in Vetiver Extract

Results from Laboratory testing

Lead \leq 20 mg/kg : Pass

Arsenic \leq 5 mg/kg : Pass

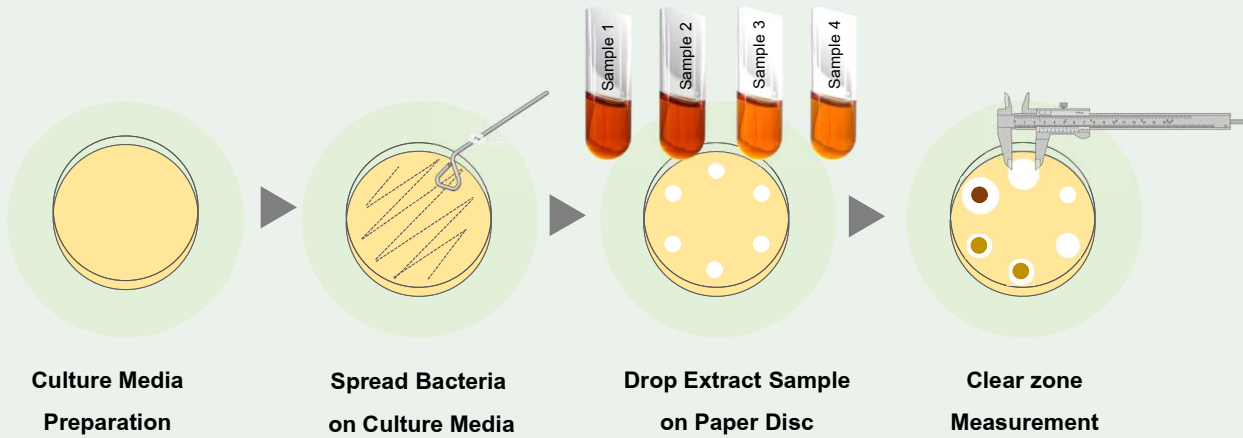
Cadmium \leq 3 mg/kg : Pass

Mercury \leq 1 mg/kg : Pass

Reference Notification of the Ministry of Public Health



MICROBIOLOGY TESTING



Tooth Decay	<i>Streptococcus mutans</i> <i>Lactobacillus acidophilus</i>
Endodontic Infection	<i>Enterococcus Feacalis</i>
Oral Thrush	<i>Candida albicans</i>

Result
 Concentration at
 1.00 % of Vetiver Crude Extract
 Inhibit all Microorganism in this Study.

From the study of antimicrobial activity of two strain of vetiver grass (Mae Tia and Surat Thani), That showed lowest concentration to use in ingredients of mouthwash, Next step to developed prototype of mouthwash added vetiver extracted at difference strain and different concentration and last step is sensory test before upscale to industrial scale.

MOUTHWASH PROTOTYPE

(Laboratory scale)

INGREDIENTS

Vetiver Extract

Solubility

Humectant

Sweetener

Flavoring Agent

Cooling Agent

Anti-Bacterial Agent

Colorant (Food grade)

pH Adjuster

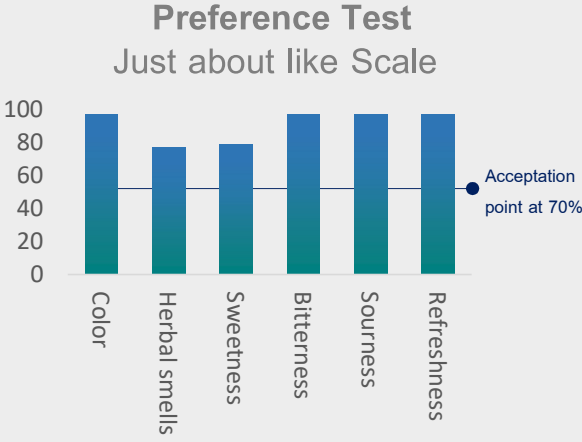
Vetiver
MOUTHWASH

Food grade or Pharmaceutical grade ingredient using in mouthwash. It's safety for Consumer.

MOUTHWASH SPECIFICATION

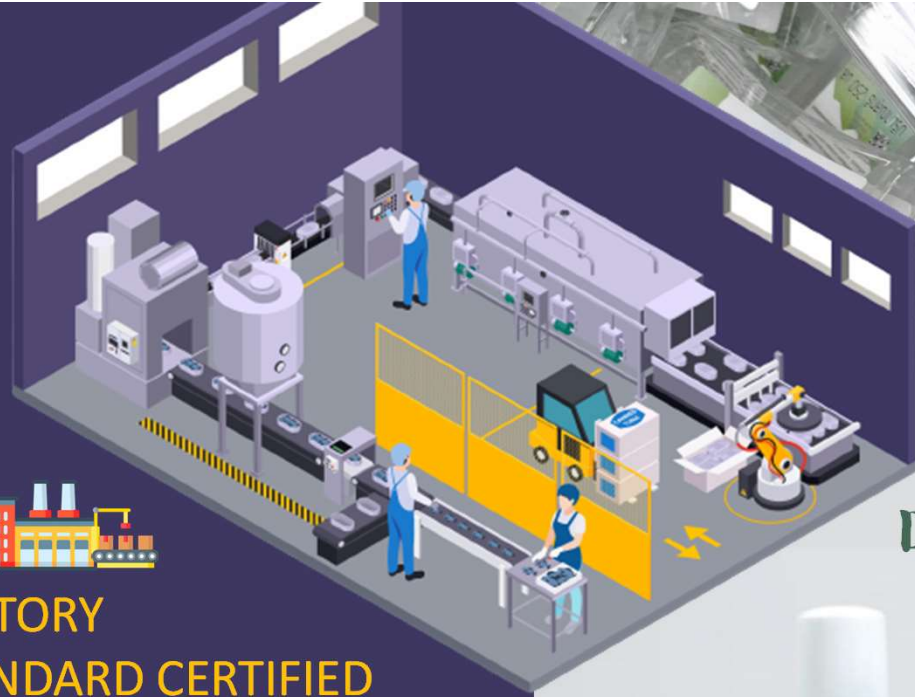
- Safety Ingredient
- Natural Ingredient from Vetiver Grass Extract
- Good physiological properties: color, flavor, and clear
- Property as consumers expect
 - Giving fresh breath
 - Gentle and not irritating the oral cavity
 - Reducing and preventing bad breath

SENSORY TEST



Acceptance Test





**FACTORY
STANDARD CERTIFIED**

GMP


ASEAN Cosmetic GMP




ISO 22716

Cosmetic Good Manufacturing Practice

HALAL

DIF Doi Tung Vetiver Refreshing Mouthwash

 Notification No. 13-1-6500023149

-  Fresh Breath
-  Gentle and does not irritate the oral cavity
-  Reduce and prevent bad breath

Net volume 250 ml.



1

OVERVIEW

DENTAL INNOVATION FOUNDATION
UNDER ROYAL PATRONAGE



2

VETIVER

with

DENTAL RESEARCH




3

CLINICAL TRIAL

of

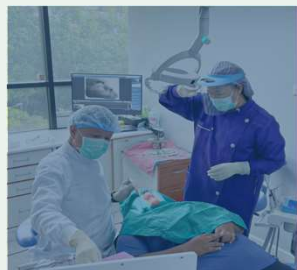
VETIVER MOUTHWASH

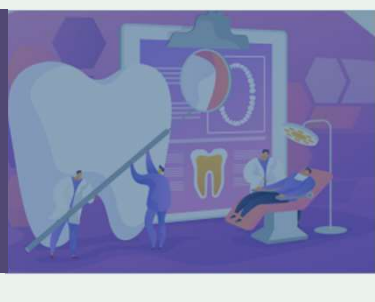


Study of the effectiveness and the safety of mouthwash containing vetiver extracted in reducing gingivitis and cariogenic bacteria

<p>4 OBJECTIVES</p>	<p>To study the efficacy of mouthwash containing vetiver extract in reducing gingivitis.</p>	<p>To study the efficacy of mouthwash containing vetiver extract in reducing plaque adhesion.</p>	<p>To study the efficacy of mouthwash containing vetiver extract in reducing causing tooth decay.</p>	<p>Study satisfaction and side effects after using mouthwash mixed with vetiver extract.</p>
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<p>2 ORAL DISEASES</p>	<p>Caries (Tooth decay) Indirect detection of carries using the number of <i>in-vitro</i> cariogenic bacteria (<i>Streptococcus mutans</i> and <i>Lactobacillus acidophilus</i>).</p>	<p>Periodontal Disease Periodontal Disease using 2 method for detected 1. Gingival Bleeding Index (GBI%) method 2. Plaque index method (PI%)</p>
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	<p>4 SITES</p>	<p>School of Dentistry, University of Payao Faculty of Dentistry, Naresuan University Faculty of Dentistry, Chulalongkorn University Institute of Dentistry, Suranaree University of Technology</p>
-------------------------------------------------------------------------------------	---------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>TOTAL 120 VOLUNTEERS</p>	
--------------------------------------------	---------------------------------------------------------------------------------------



VOLUNTEER QUALIFICATION

Inclusion Criteria

- Volunteers with all levels of gingivitis and Tooth decay volunteers upper 20 years old
- Do not use mouthwash and not got antibiotics for 14 days until clinical trial testing
- Volunteers are 20 Teeth in oral
- Volunteers are people who can help themselves
- Volunteers are not a disease that affects oral health care by yourself

Exclusion Criteria

- People with an alcohol allergy
- People with all types and levels of diabetes
- Those who are pregnant and breastfeeding
- People who wear braces
- Smoker

Benefit for Volunteer

- Oral health checkup by dentist (Before and after)
- Get free mouthwash throughout the project
- Teeth cleaning treatment (After finished project)



Volunteer Registration
(30-32 Volunteer/Site)



Primary Screening
(Health Behaviors Interview)



Secondary Screening
(Oral Health Check Up)



Evaluate levels of
Gingivitis and Tooth decay



Mouthwash using after brush
the teeth (2 times daily x 7 days)



1st Follow up on day 7



Mouthwash using after brush
the teeth (2 times daily x 7 days)



2nd Follow up on day 14






Teeth cleaning treatment

TRIAL PLAN

Objective to compare the efficiency of before and after using mouthwash

Time	Day 0	Day 1	Day 7	Day 14
Activities	Oral Health check up	Start using mouthwash	1 st Follow-up	2 nd Follow-up

Directions for use : 20 ml/time x two times daily x 14 days

	January	February	March	April	May	June	July	
Ethic Committee Accepted								
Volunteer Recruited					 FULL REGISTER VOLUNTEER (29 TH May 2023)			
On process clinical trial								
Clinical trial Finished								
Results Analyzed						 		

DENTAL INNOVATION FOUNDATION UNDER ROYAL PATRONAGE

Free Products

OMJ / JELLY
Oral Majorizing Jelly



- Honey Lemon Flavor
- Strawberry Flavor

AOF
Anti Oral Cancer Food



- Mango Flavor
- Passion Fruit Flavor

Dental Services



Dental Implant



Treatment



Oral Hygiene



Dentures



Orthodontics




Dental Surgery



Periodontology




Cosmetic Dentistry

 www.dent-in-found.org

 <https://www.facebook.com/dentalinnovation40>

 @dent_in_found

 02-318-2351-5 Ext. 1403, 1416

Acknowledgement



THANK YOU