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RESULTS OF ERIE SILK DYEING FROM FERMENTED BANANA TRUNK BIO-EXTRACTS APPLIED TO THE READY-TO-WEAR FASHION DESIGN

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Keywords: Colorfastness, Bio-Extracted, Fermented Banana Trunk, Ready-To-Wear Fashion

ABSTRACT

The Objectives of the research are 1) To study the variation ratio of color concentration and variation of time duration in bio-extracted, fermented banana trunk dyeing effect to Erie Silk fabric colorfastness and 2) To design and made bio-extracted, fermented banana trunk dyeing Erie Silk fabric into ready-to-wear fashion. The research method was Mixed Methods Research (MMR) which was Experiment and Quantitative Research collecting data from experiments, and employed survey, interview and opinion assessment guidelines to be analysed the colorfastness level according to Thailand Industrial Standard; Average and Deviation, and market acceptances. The results are variation of color concentration and time duration of the bio-extracted, fermented banana trunk to the colorfastness to light, to hot pressing, to dry cleaning, to acid and alkali perspiration, found the colorfastness in the parts: color change and color staining scored was higher more than level 3 in scale of which is acceptable. Exception is the colorfastness to soap wash in all level of concentration and time duration lower than the standard but no effect to color staining to diverse fabric type DW. It is recommended to avoid washing in normal condition. Fashion Application of Erie Silk textile dyed by the bio-extracted, fermented banana trunk found the overall rating at extremely agree at 4.55 in Average, and 0.66 in Deviation.

INTRODUCTION

Garment and textile industry take vital roles in economic development in Thailand. In February 2021, the overall picture of world garment and textile trade had US$ 501.9 million in value, 12.5% decreased compared to the same period of the last year. (Thailand Textile Institute, 2021) Thailand need to adjust and accelerate economic supports especially in the Covid 19 pandemic that fail all sectors to the ground. The Federation of Thai Industries stated the export trend of the nation in the second half of 2021 has good opportunity to recover with supportive factors in the current economic situation particularly in fashion and lifestyle industry. When world economic situation is bettered, household and business sectors like hotel and restaurant turn to recovery mode and increasing of customers' demand, and money spending power reactivate in creative handicrafts particularly community handicrafts. (Federation of Thai Industry, 2021)

Community handicrafts in Thailand particularly hand-woven fabric has reputation for their finest in artistry and authentic, diversity and identity. Khon Kaen is one of the most prominent and reputation in its' identity verified by the World Handicraft Council as "Madmee City of the World", the first and only in Asia. This is spotlight turning to local producers to be ready for any improvement for the innovation particularly fiber production and Erie Silk which is wild silk, was introduced and transferred know-how and knowledge to local producers to understand the complete circle of production.

Erie Silk raised by tapioca leaf feeding which is a local farm plant and promotion of Erie Silk aimed to increase silk production among tapioca farmers' families as supplement income and jobs creation in rural famers' communities. (Orapin Jintasathaporn, 2006) Erie Silk is smooth, soft with unique texture and pattern in its textile similar to wool and variation of transformation is highly available and diverse; garment, ornament to garment and fashion and home decoration, for example.

Presently the new generation takes greater roles in fashion and garment industrial production and model changes and they lead in convenience, time saving lifestyle and to cost saving from costly synthetic dyes. It affecting producers and consumers' demands and the eco threats and hazardous products in production process issues i.e. from the toxic and allergies reactions to health and ecosystem of metallic synthetic dyes, compelling these people to rethink about natural dyes. (Anansawek Hewsengchareon, 2000) Khon Kaen province's policy is to promote more natural dyes in replacing of the synthetic dyes in health and eco-friendly awareness.

Other than environmental and eco-friendly textile production, it is promoting chemical-free agricultural activities to reduce impact on eco system, physical and bio. (Khon Kaen Provincial Office, 2016) Finding natural means to replace chemical usage initiated natural products from the microorganism activity known as 'Bio fermenting' in the form of dark brown solution from plant or animal residue fermented in the microorganism decomposing reaction process.(Center for Agricultural Productivity Development, 2004 and Chaiwat Chaisut,

2010) Simply and low-costly produced particularly banana trunk fermented by microorganism which is capable in soil nitrogen fixation and produce antibiotic substance to control bad germs caused plant diseases in soil. Besides banana trunk full of tube filled with weak acid and astringent that is tannin found in every part of trunk. Tannin is natural substance given natural color favored to use as mordant for color adherent mostly found in glycoside form. It has also an amount of free Phenolic compound capable for protein binding and Polymorph of Phenolic compound which has the same bond structure with flavonoid the same plant based favorable for dyes extraction substances for textile dyeing in fashions market.

In the time when fashion creators aware of more eco-and- environmental-friendly product and production and that urged Khon Kaen textile producers creating fashion goods in environmental sustainability and be more nature relying in concepts. And as high price products for the materials likes natural dyes are seasonal, and need a high quantity of dyes volume to get dark shade as wants caused limitation. Dyes extraction, dyeing and weaving of fabric are complicate and consume time when applied to fashion products made a high cost plus these local producers had no fashion market and design ideas to access, these natural products were out and no market in target groups. Mostly they are considered the price is too high compared to quality and design.

Siriorn Narkdaeng (2009) studied potentiality of native weaving wisdom of the Northeastern people found both high potentiality and skillfulness in local weavers/producers though the lack of knowledge and know how in production process including to the design that attractive to markets and consumers' demands. It is to clarified that goods from local weaving required quality improvement to match in-fashion and access to buyers in lifestyles and so on. It is as well to reach creative industry in world scene sustainably and the need to regrade proper standard particularly the quality of colorfastness of the fabric and ready to wear for everyday life. According to laundry products containing mainly chemical substance; detergent and fabric softener, and even the UV light and heat therefore textile and garment need to reach standard of the colorfastness together with the fashionable products. These important factors cannot be ignored as it is to add value to the products and upgrade from local to competitive world markets.

From the issues above, the researcher viewed the important to find out the efficiency of dyeing in Erie Silk of which is charming in its' origin and story with the natural dyes like colorant quality from the bio-extracts and from the fermented plant like banana trunk. The variation of concentration and time duration something close to producers perception and capability to the colorfastness high quality of the ready-to-wear fashion to ease the complication of the exotic, native, difficult reproducibility of shade to the simple cold dyeing process to build two aspects of the body of knowledge from the beginning to be transferred to community producers for sustainability of local occupations and in order to help reducing hazardous chemical uses affected to both producers and consumers.

OBJECTIVES OF THE RESEARCH

To study the ratio of concentration and time duration of dyeing process for the colorfastness of Erie Silk dyeing from bio-extracted, fermented banana trunk

To apply Erie Silk from the bio-extracted, fermented banana dyeing to the design and made of ready-to-wear fashion

MATERIAL AND METHODS

Study concentration and time duration of dyeing for the colorfastness of Erie Silk dyed with bio-extracted, fermented banana trunk, had these material and methods.

Material, Chemical Substance and Device

Material

Hand-woven Erie Silk in structure of balance pattern-polished weave after silk degumming in size 12 x 18 cm, weigh 4 grams. Smooth, bleached, non-mercerized, non-dyed cotton textile and multifiber type DW textile.

Chemical Substance

Standard soap, purified water, L-Histidine Monohydrochloride Mono-hydrate ($C_6H_9O_2N_3$•HCl•H_2O), Sodium Chloride (NaCl), Di Sodium Hydrogen Orthohydrogen orthophosphate, Di-Sodium Hydrogen Orthophosphate Dodecahydrate (Na_2HPO_4•$12H_2O$), Sodium Hydroxide (NaOH), Sodium Di-hydrogen Orthophosphate (NaH_2PO_4•$2H_2O$)

Devices

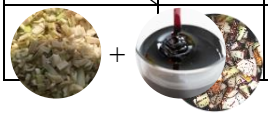
These device, apparatus and machine used in the process: Xenon arc lamp apparatus, Temperature & Humidity Chamber, Hot Pressing Test Device, Grey Scale for color changing assessment, Grey Scale for color staining assessment, Color Checking Light Box, Launder-Ometer), Hot-wind machine, Control Box, pH meter, Acrylic-resin sheet, 5 kg. weight–Piece, Perspirometer

Methods

Color Extraction

Less than 2 meter in high banana trunk chopped into thin, small pieces mixed with molasses in 3:1 (banana trunk: molasses: kilogram) put into well-covered container to be 7-day fermented, placed the tank in shade with good ventilation, stirred twice daily; morning and evening, and in the due date filtering all the banana trunk pieces out of solution.

Table 1. Process of dyeing in color extraction from bio-fermenting process

Time / Source	Bio-extracted, fermented banana trunk Process							
	Day1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Color
								

Dyeing

Water bath the prepared fabric pieces before bathing in the colorant for 20 minutes and prepared colorant in variation of concentration at 25, 50 and 75 in percentage (bio-extracted, fermented color: water: ml.). Using 500 ml. tube for 450 ml. color solution and for average 4 grams of fabric piece in time duration of 30, 60 and 90 min respectively at 30 degree C. In time duration completion, these fabric pieces were left dry in room temperature and wash with purified water and left to dry again.

Colorfastness Testing

Colorfastness test to Xenon arc light according to 121 Vol. 2-2552 TIS (Thai Industrial Standard) applied for Natural Daylight D_{65}. The test fabric pieces were the size not less than 45 x 10 mm. and conduct Method No. 5 exposed in the Xenon Arc Light apparatus in normal condition then compared the piece from the light to the piece of which covered some part to see the difference and compared to Grey Scale in according to TIS. 121 Vol. 14 (Thai Industrial Standard Institute, 2009)

Colorfastness to heat by hot pressing according TIS 121, Vol. 35-2556; prepared test fabric pieces size 40x100 mm and adjust the test piece in control temperature at 20 (± 2) degree C and relative humidity at 65 (± 4) for 6 hours or until the test piece(s) in balance condition. And conduct dry test by put smooth-surface, bleached, non-mercerized and non-dyeing cotton fabric piece under hot pressing gear then put the test piece on top of the cotton piece, press the weigh pressing gear on the test piece at 150 degree C heat for 15 second and left the test piece to cool down and assess color changing according to the TIS Color changing test standard in TIS 121 Vol.14. Grey Scale Test and assessment done immediately in the assessment box and color stain assessment from the dovetail piece was seen and assessed the worst stain as standardized in TIS 121 Vol. 14 comparison of the Grey Scale in the assessment box and kept the test piece in standard environment and condition for textile test according to TIS standard for 4 hours. (Thai Industrial Standards Institute, 2013)

Colorfastness to soap wash (laundry) test according to TIS 121 Vol. 3-2552 by test piece size 40 (± 2) mm x 100 (± 2) mm. sewed test piece every side to stop unravel and runstitch dovetail with multifiber type DW. piece in size 40 (± 2) mm. x 100 (± 2) mm. in one side with non-luminol thread by which put the front

side stitch to multifiber piece and put the test piece in the tube then fill standard soap solution 0.5% in ratio of solution: material at 50:1 and closed the wash tube. Wash immediately using Launder-Ometer at 50 degree C for 45 minutes. After the washing took the test piece out from the tube then put into a beaker filled with purified water in room temperature, soft stir for one minute and pour purified water onto the test piece to rinse water through the piece for one more minute and to get rid of the exceed water hand-squeezed the test piece and left-dried in temperature less than 60 degree C by spreading the two pieces out. Assessment made when these pieces fully dry to see color change and color stain in the runstitch piece using Grey Scale according to TIS 121 Vol. 14 standard. (Thai Industrial Standards, 2009)

Colorfastness to dry cleaning; adapting from soap wash colorfastness test according to TIS121 Vol. 3-2552. By prepared test piece of the fiber size 40 (± 2) mm. x 100 (± 2) mm. sewed to stop unravel every side and runstitch with multifiber type DW size 40 (± 2) mm. x 100 (± 2) mm. in one side with non-luminol thread to the front of the test pieces. Put the test piece in a tube then filled with Crystal dry cleaning liquid in the ratio of solution to material, 50: 1 closed the wash tube and wash immediately by Launder-Ometer at 50 degree C for 45 min. After the washing completed took the piece out to hand-squeezed and win dry in temperature not exceed 60degree C., spread the pieces and assessment done when fully dry to assess the color change and color stain and the dovetail piece. By Compare the sample piece with the dovetail piece as a pre-test using Grey Scale according to TIS 121 Vol. 14. (Thai Industrial Standards, 2009)

Colorfastness to acid and alkali perspiration according to TIS 121, Vol. 4-2552). Prepared test piece in size 40 (± 2) mm. x 100 (± 2) mm. sewed to stop unravel and runstitch with a piece of multifiber type DW. the same size with non-luminol thread and put the front side to the dove tail piece. Lying the test pieces on the flat plate and spread the test piece for the artificial acid and alkali perspiration prepared the solution according to the TIS 121 Vol. 4-2552. Pour the solutions on each piece spread in the ratio of solution to material 50:1 ensure the test pieces well soaked and left in the solution at room temperature for 30 mins, press and move the test pieces from time to time to ensure the solution well soaked up. Later put the test pieces on acrylic resin sheet and put the acrylic resin sheet in Perspirometer after the heat was prepared to reach 37 degree C., after the sheet put in the devise, adjusted the device for the pressing on the test sheet at 12.5 Kg Pascal by 5 kgs weight put on them and put the set in the hot box at 37degree C. for 4 hours. Then test the pieces from the hot box, spreading the sample piece from the dovetail piece and left dry in temperature less than 60 degree C, in spreading these pieces and dry them in order to assess the color change and color stain on both pieces using Grey Scale in according to TIS. 121 Vol. 14 (Thai Industrial Standards, 2009)

Experimental Plan and Data Analysis

The experiment had two factors; variation of concentration in 3 levels of percentage-25, 50 and 75, and time duration for dyeing process in 30, 60 and 90 min at 30 degree C., altogether 9 samples for the experiment model 3x3 factorial

and applies 3 x 3 factorial in completely randomized design for the 3 repeated time experiment. And conduct analysis process of colorfastness in Grey Scale according to TIS 121 Vol. 14.

In apply Erie Silk from bio-extracted, fermented banana trunk color in design and make of ready-to-wear fashion conducted the research as following.

Collected data and information recorded about ready-to-wear fashion and analysis conclusion from papers, texts, documents, relevant researches and interviewed fashion specialists with unstructure interview.

Survey ready-to-wear fashion in Khon Kaen province, Thailand; analysis of world fashion trend and local fashion trend in order to find keywords to define and rearrange attribute and search for suitable fashion to local market. In composition of structural silhouette, colors, material and details, drawing of designs to match local ready to wear demands proposed to fashion specialist(s) to be considered the consistency and harmony between design drawings, the trend and market demands then the results were brought to improvement and made patterns for the ready to wear.

Opinion survey from 132 samples to review the application of Erie Silk dyed from fermented banana bio extracts to ready-to-wear fashion via online questionnaires inquired of which divided into 2 parts: Part 1. Demographic data and information, Part 2. Applying of the Erie Silk dyed from fermented banana trunk bio extracts to the ready-to-wear garment fashion. Assessment done by 5 level of values and analysed the consumers' opinions employed statistic method: Average and Deviation.

RESEARCH RESULTS

From ratio of concentration and time variation effect of dyeing for Erie Silk colorfastness from bio-extracted, fermented banana trunk colorant;

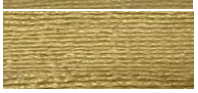
Extraction results

Color extraction from bio fermenting found microorganism reaction in fermenting of banana trunk in the second day from the decomposing of the trunk pieces, smell of alcohol, filling vapor in container surface and fully decomposing in the seventh day that appeared to be red-brown liquid in pH 4.5

From Table 2. Erie silk fabric after dyeing process from natural dyes of bio-extracted, fermented banana trunk in variation of concentration and time duration. It was found the ratio of concentration of the solution affected to the change of color shades after the dyeing process finished in percentage of concentration at 75 in 30, 60, 90 min time duration has darker and lighter shades in the same time duration hence the concentration of the solution affected the changes of color shade but the time duration had no effect on the shades change.

Results of dyeing

Table 2. Results of Erie Silk dyeing in variation of concentration and time duration

Time Ratio	30	60	90
25			
50			
75			

Colorfastness Test Results

Colorfastness quality in Thailand Industrial Standard (TIS), fabric test must gain score in level 3 or higher to be acceptable.

Colorfastness to light

Table 3. Presenting the levels of colorfastness to light at the variation ratio of concentration and time duration in dyeing process

Concentration (%)	**Time Duration (min)**	**Color Change (Fastness level)**
25	30	3-4
50	30	4
75	30	4
25	60	4-5
50	60	5
75	60	5
25	90	4-5
50	90	4-5
75	90	4-5

From Table 3. Presenting the color changing in the variation concentration of solution in time durations which colorfastness is in up to level 3-4 to level 5 in which equal or higher than level 3 for acceptability. And this is showing the variation of concentration and time duration have very good colorfastness to light.

Colorfastness to Heat by Hot Pressing

Table 4. Presenting colorfastness to heat by hot pressing to color changes and color staining of Erie Silk in dovetail at variation of solution concentration and time duration

Concentration (%)	Time (Min)	Colorfastness Level	
		Color Change	Color Stain
25	30	5	5
50	30	5	5
75	30	5	5
25	60	4-5	5
50	60	4	5
75	60	4-5	5
25	90	5	5
50	90	4	5
75	90	4	5

In Table 4. Presenting the color changes in every ratio of concentration and time duration and the level of score up to 4 and to 5 above 3 which is acceptable scale. Color Stain in all concentration and time duration variation at the level 5 above the acceptable scale of 3. It showed Erie Silk in the bio-extracted, fermented banana trunk dyeing process has colorfastness to heat in hot pressing in good level.

Colorfastness to soap wash

Table 5. Presenting color changing in every ratio of color concentration and dyeing time has colorfastness less than 3 score level in scale which is unacceptable. And the color staining in all variation of concentration and time has colorfastness score at 4-5 level in scale above the acceptable of 3. It showed the colorfastness of Erie Silk in this dyeing process has no durability in soap wash that color and fiber rip off very much and change was obviously seen, however no effect to color stain in diverse fibers type DW.

Erie Silk dyed by fermented banana trunk bio extracts designed to attract ready-to -wear market concluded from the research as follow.

Thailand, in Khon Kaen province, ready-to-wear fashion for eco-friendly Erie Silk market suvey conducted in the Levy & Weitz (2000) framework categorized fashion market into 2 types; Hi-class fashion and Ready to Wear fashion. Field work done employed in-dept interviews with enterpreneurs, academics and fashion specialists of which found there is no hi class fashion in consumers lifestyle. According to social and economic and lifestye is in avearge and not attractive to hi class fashion though the province well known and announced reputation to be ‘World Madmee City’. Potentiality of the societies either world trend influences do not play any outstanding roles in the local market but the ready-to-wear outfits spreading all over the center of the business, education venues and shopping malls.

Table 5. Presenting of Colorfastness to soap wash in color change and color stain in diverse fabric type DW in variation of concentration and time

Concentration (%)	**Time (Min)**	**Colorfastness**						
		Color Change	**Color Staining**					
		Erie Silk	**Acetate**	**Cotton**	**Polyamide**	**Polyester**	**Polyacrylic**	**Wool**
25	30	1-2	5	5	5	5	5	5
50	30	1-2	4-5	4-5	4-5	4-5	4-5	4-5
75	30	2	5	5	5	5	5	5
25	60	1-2	5	5	5	5	5	5
50	60	2-3	5	5	5	5	5	5
75	60	2	4-5	4-5	4-5	4-5	4-5	4-5
25	90	2	4-5	4-5	4-5	4-5	4-5	4-5
50	90	2	5	5	5	5	5	5
75	90	2	5	5	5	5	5	5

Table 6. Presenting color changing and color staining in all variation of concentration and time duration has colorfastness level score at 5 in scale above acceptable level at 3. Erie Silk has colorfastness to dry cleaning in good level from the dyeing process by bio-extracted, fermented banana trunk which used oil as dirty solvent with no damage done to color and fiber. The dry-cleaning liquid made of Carbon Tetrachloride (CCl_4) from petroleum and acetone purification.

Colorfastness to Dry Cleaning

Table 6. Presenting colorfastness to dry cleaning of Erie Silk color change and color staining of diverse DW fibers in variation of concentration and time duration

Concentration (%)	Time (Min)	Colorfastness						
		Color Change	Color Stain					
		Erie Silk	Acetate	Cotton	Polyamide	Polyester	Polyacrylic	Wool
25	30	5	5	5	5	5	5	5
50	30	5	5	5	5	5	5	5
75	30	5	5	5	5	5	5	5
25	60	5	5	5	5	5	5	5
50	60	5	5	5	5	5	5	5
75	60	5	5	5	5	5	5	5
25	90	5	5	5	5	5	5	5
50	90	5	5	5	5	5	5	5
75	90	5	5	5	5	5	5	5

Colorfastness to Acid perspiration

Table7. Presenting colorfastness to Acid perspiration of color changing of Erie Silk and other DW fibers in variation of concentration and time in the dyeing process

Concentration (%)	Time (Min)	Colorfastness						
		Color Changing	Color Staining					
		Erie Silk	Acetate	Cotton	Polyamide	Polyester	Polyacrylic	Wool
25	30	4	4	4	4	4	4	4-5
50	30	4	4	3-4	3-4	4	3-4	4
75	30	4	3-4	3-4	3-4	4	3-4	4
25	60	4	4	4	4-5	4	4	4

50	60	4	4	4	4	4	4	4
75	60	4	4-5	4	4	4	4	4
25	90	4	4-5	4-5	4-5	4-5	4-5	4-5
50	90	3	4-5	4	4	4	4	4
75	90	3	4-5	4	4	4	4	4-5

Table 7. Presenting color changing in variation of concentration and time that has colorfastness in higher level than 3 or in level 3 which is acceptable. Color staining, over all, has contained colorfastness in 3-4 level to 4-5 level above the acceptable level as well. Concluded that Erie Silk dyed by bio-extracted, fermented banana trunk color in variety of concentration and time contained good quality of colorfastness to acid perspiration.

Colorfastness to Alkali perspiration

Table 8. Presenting colorfastness to alkali perspiration of Erie Silk color changing and other type DW diverse fiber in color staining at variation of concentration and time of dyeing

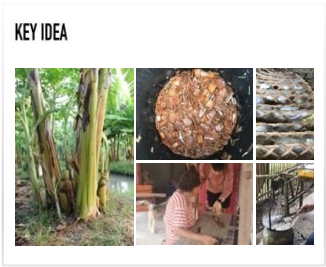
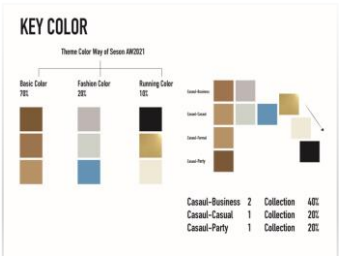
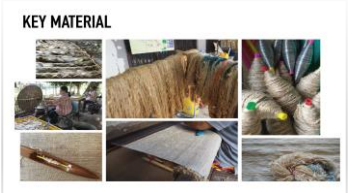
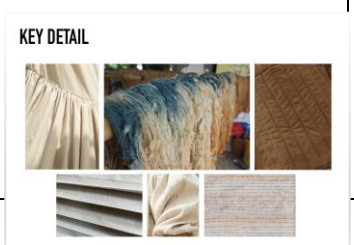
Concentration (%)	**Time (Min)**	**Colorfastness**						
		Color changing	**Color Staining**					
		Erie Silk	**Acetate**	**Cotton**	**Polyamide**	**Polyester**	**Polyacrylic**	**Wool**
25	30	4	4	3-4	4	4	4	4
50	30	3	4	3-4	3-4	3-4	3-4	3-4
75	30	3-4	4	3-4	3-4	3-4	3-4	3-4
25	60	3	4	3-4	3-4	3-4	3-4	4
50	60	3	4	3-4	3-4	3-4	3-4	3-4
75	60	3	4	3	3-4	3-4	3-4	3-4
25	90	3	3-4	3-4	3-4	3-4	3-4	3-4

50	90	3	4	3-4	3-4	3-4	3-4	3-4
75	90	3	3-4	3-4	3-4	3-4	3-4	3-4

Table 8. Presenting color changing in variation of concentration and time in dyeing, colorfastness was in higher than level 3 to level 4 in acceptable scale. Color staining in variation of concentration and time duration has contained colorfastness at 3-4 and 4 which is above the 3 level as acceptable level. It showed the Erie Silk dyed by bio-extracted, fermented banana trunk color solution has colorfastness to alkali perspiration in average level.

Redy-to- wear is popular and accpeted widely as the pattern and styels of fashions both affordable price and quality are well suitibly to way of livings. However the native weaving in these ready- to-wears are not popular and not obviously attractive for everyday life but viewed as special occiasion outifts. World Fashion trend analysis from WGSN Autumn/winter 2020-2021 (WGSN, 2021) and trend of native or local textiles in Thailand from Thai Textiles Trend Book Spring/Summer 2022 (Department of, 2020) in concepts in order to conclude the meaning and all aspects interpretation of keywords to define over-all picture of design and analysis on the consumers' demands and tendency of fashion trends consisting of attitude, behavior, facility and required services including to business potential.(TCDC, 2562) Brought to design as main composition; concept, structural silhouettes, color, material and details including inspiration from local and native favors communicated in Symbolic Interaction concept that Kanjana Kaewthep (2004) explained. Kanjana described Symbolic Interaction as constructed of the meaning to represent identity via tangible object, artifacts, images, picture or figure of which in this design access to native architecture in the provincial slogan known as 'Phra-dhat Kham Kaen'. Analyzing of the religious architecture remarkable feature in which contain abstract in meaning, interpreted into world fashion design by these following concept and trend making.

Table 9. Presenting of the concept and trend to the design of the target material for ready-to- wear fashion

Topic	KEY DESIGN	Application
Idea		Innovation from local wisdom produced native weaving enabled to cut of production cost and transfer know-how to community in sustainability. The products contain identity in dyeing and weaving originally compatible for their own current livelihood and to the present World demand.
Target group		Key Target Group is Millennials, female and male, age between 23-38 who adore the story of products. From the raw materials, steps of the production and completed product in eco-friendly, reflecting caring lifestyle and confident consumers.
Silhouettes		Silhouettes of outfits from World fashion trend, form of the outfit as competitors' brands and interpretation of native fashion trend in the fashion design components.
Color		Key Color is mainly from bio-extracted fermented natural stuff. Fashion color presenting seasons from the World fashion trends analysis. Running color functioned in integration with Key Color and fashion color appeared to be native color creation.
Material		Key Material is Erie Silk of which eco-friendly production process, mix and match with contemporary, World fashion trends materials plus native favors fashion in identity and attractive styles.
Detail		Weaving: Texture of the fabric is not smooth but coarse, fine and dense for variation of Erie silk thread size woven mixing with fancy tinsel to add sparkling and shiny to the fabric, dress making

		technics decorated by: ornamental fringe, Quilting and Pleating

C.

Picture 1. Prototype model of applied ready-to-wear women fashion made from Erie Silk dyed with bio-extracted, fermented banana trunk (A) Casual-Casual (B) Casual-Business (C) Casual-Party

C.

Picture 2. Men fashion prototype from Erie Silk applied to, of which the Erie Silk dyed from Bio-extract, fermented banana trunk (A) Casual-Casual (B) Casual-Business (C) Casual-Party

Opinion of Consumers on Ready-To-Wear fashion from the Erie Silk dyed from Bio-extract, fermented banana trunk

Table 10. Presenting of Average and Deviation and Opinions in level of acceptances to the Erie Silk dyed from bio extracted, fermented banana trunk designed to ready-to-wear.

Opinions	**(n=132)**		**Scale & Level**
	$\bar{x}$	**S.D.**	
1. Suitable for everyday uses	4.46	0.71	Mostly agree
2. In fashion and adaptable for diverse social occasions	4.60	0.63	Extremely agree
3. Suitable in affordable price, match the life style and in good quality	4.38	0.74	Mostly agree
4. Create community innovation and value added for further development in business advantage	4.66	0.61	Extremely agree
5. Enable to promote eco-friendly and resources sustainability attitude and lifestyles	4.67	0.60	Extremely Agree
Overall rating	**4.55**	**0.66**	**Extremely agree**

Table 10. Presenting consumers' opinions to the ready to wear garment made from Erie Silk in the eco-friendly and resources sustainable concept with fermented banana trunk bio-extracts in extremely agree with the new trend production at the Average 4.55 in 0.66 Deviation. In studying of the topic of the opinions, one by one, found the promotion of eco-friendly and resources sustainability is the highest in score in extremely agree at Average 4.67 and 0.60 Deviation. The second highest is Bring innovation to community and enable to develop to the new concept of community business that the consumers agree to it extremely in the Average of 4.66 in 0.61 Deviation. The target consumers viewed the In-fashion and adaptable to multi-social occasions to the level of extremely agree in 4.60 average and 0.63 Deviation. In the opinion about these outfit fashions are enable to apply to everyday life, the consumers agree mostly at the Average score of 4.46 in Deviation of 0.71. And for the suitability to the everyday lifestyle, the consumers agreed most at the Average score of 4.38 and Deviation at 0.74 respectively.

CONCLUSION AND DISCUSSION

This research focused on colorfastness of the natural dye processed by making bio-extracts from fermented banana trunk for Erie Silk and develop to be applied to fashion design of local ready-to-wear. It was found the dye extract from fermented stuff as bio-extract of decompose microorganism to have pigment in brown liquid from banana trunk fermenting in the kilogram ratio 3:1(Banana: Molasse) to have the final pH 4.5 which differed from Somkiat Pornpisutthimat and others reported in the 14^{th} day, final pH of the bio-extract is 3.0 but in compatibility with Chuthamat Chusakun and Ankhana Chatkon (2016) that the study showed final pH of mordant from and for natural dye for quality and color shade of silk dyed from shellack/resin to have suitable bright brown is pH3-4. It ensured the bio extracts from banana trunk fermenting can dye Erie Silk fabric. Besides compound of Tannin with an amount of free Phenolic compound capable enough to bind protein in Erie Silk and attach to

pigment in Flavonoid structure. In accordance with Suri Futrakun (2001-2002) studied the separation and increasing of natural color produce from microorganism for dyeing industry and found the separation of substance to give color from microorganism, pigments sorted into groups which is substance produce color in Flavonoid, Anthraquinone and Carotenoid from chemical structure chemical test. Colorfastness test of Erie Silk dyed by bio extract from fermented banana trunk follow the test of TIS found the colorfastness to light, to hot pressing, to dry-cleaning, to acid and alkali perspiration at concentration ratio of 25, 50 and 75 in time duration of 30, 60, 90 min containing the colorfastness quality above and equal 3 or it's acceptable and higher, and applicable to everyday use as ready-to-wear styles and it has high potential for main material for design and made of everyday wear.

From the ready-to-wear and everyday uses, the material is valuable from the opinion of consumers. Their views on the Erie Silk dyed from this process is well agreed mostly at the average 4.55 and Deviation 0.66. When considered by each topic found capable to promote lifestyle and eco-friendly attitude and sustainability, they agreed in the highest level at Average 4.67 and Deviation 0.60. In which in accordance with Linda Ra-te (2013) reported her research on Strategy Development for Native Weaving in Lower Northeastern Thailand and found the strength of community entrepreneurship is ready-to-wear, eco-friendly product but in a high cost for the time-consuming production and lack of know-how and information about fashion design, which could not lead to the sustainable fashion industry. This aligns with Ranavaade (2021), who studied the fashion industry in India and found that the new direction for the fashion industry and the production cycle for the sustainable future came from understanding the direction of fashion studies, which is the conceptual root and technique for creating valuable human resources who will be leading the concept for the future fashion industry. This research aimed at building innovation from existing local wisdom in textile natural dyeing of which can be transferred to local communities sustainably. It is also reducing hazardous chemical to producer and consumer health, reducing cost for using all season available plant and reducing power use for heat. It is to empower local entrepreneurs and producers to develop their products creating ideas for further eco-friendly and available materials in local supply to eco-friendly community products.

RECOMMENDATIONS

For the further research

Studying dyeing support substances and suitable conditions of bio-extracted fermented banana trunk for Erie Silk dyeing in order to develop colorfastness to normal wash.

For the future research

Studying dyeing support substances to develop color shades for other types of textile and fibers and other fashion markets to have data and information for the future trend of fabric quality and standard development.

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