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Çorlu Engineering Faculty
Textile Engineering Department

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**listed in alphabetical order*

Keynote Speakers

Prof. Dr. Xungai WANG

Deakin University, Institute for Frontier Materials, Australia

"An Update on Animal Fibre Research"

Prof. Dr. Luboš HES

Technical University of Liberec, Faculty of Textile Engineering, Czechia

"Thermophysiological Comfort of Wetted Woollen Fabrics"

International Congress on Wool and Luxury Fibres, ICONWOOLF2019
Scientific Program

19 APRIL 2019

09.00-11.00		**HALL 2** **OPENING CEREMONY AND PANEL:** **Moderator: Prof.Dr. Rıza ATAV** **The Latest Wool and Silk Fibre Trends in The World; Expectations and Demands of Textile Sector**	
11:00 - 11:30		**COFFEE BREAK**	
11:30-12:00		**HALL 2** **PLENARY SESSION Prof.Dr. Xungai Wang-An Update on Animal Fibre Research**	
12:00 - 13:00	**HALL 1** **Pretreatment & Yarn Production** **Chairman: Prof. Dr. Bojana VONČINA**	**HALL 2** **Fibre Science and Technology** **Chairman: Prof. Dr. Xungai WANG**	**HALL 3** **Dyeing** **Chairman: Prof.Dr. Aslı Demir**
12:00-12:15	5204-Oxygen Plasma Pretreatment for Improving Wool Properties /**Jelena Peran** - Sanja Ercegović Ražić - Ana Sutlović - Tomislav Ivanković - Josip Jelić	5237-Performance Evaluation of Alpaca and Llama Fiber Using Two Tester Instruments /**Edgar Quispe** - Tumen Wuliji - Max Quispe	5375-Statistical Optimization of Natural Dyeing of Plasma Treated Wool /**Aminoddin Haji**
12:15-12:30	5224-Optimization of Scouring Process for Wool Fleece /**Pelin Altay** - Raziye Atakan - Gülay Özcan - Muhammed Emin Çoban - Ilknur Özcan	5438-Effect of Fiber Diameter on the Single Fibre Strength of Angora Rabbit Fibre /**Levent Önal** - E. B. Ozkan	5178-Barberry Shrub Roots In Dyeing Of Wool Fabrics /Hüseyin Benli - **Muhammed İbrahim Bahtiyari** - Fazlıhan Yılmaz
12:30-12:45	5300-Development of Functional Products Using Animal Fibers with Vortex Spinning System /**Eyüp Ali Satıl** - Serkan Nohut - Ebru Çelikten - Osman Yayla - Suna Karakurd Elma - İsmail Kaynak	5377-Sheep Breeds Genetic Diversity of Farm Animal Genetic Resourches of Turkiye /**M. İhsan Soysal** - Emel Özkan Ünal	5242-Obtaining Vintage Effect on Woollen Fabrics via Ozonation /Rıza Atav - **Şeyma Soydaş**
12:45-13:00	5249-The Effect of Cashmere Fibres on the Thermal Comfort Properties of Worsted Fabrics /Duygu Yavuzkasap Ayakta - **Eren Oner**	5277-An Investigation of Dehairing Properties of Anatolian Goat Hair /**Gülçin Canipek** - Fatma Göktepe - M. İhsan Soysal	5332-Effect of Liposome on Mohair/Wool Blends Dyeing /Gülşah Ekin Kartal - Berrak Buket Avcı - **Gökhan Erkan** - Merih Sarıışık
13:00-14:00		**LUNCH**	
14:00-14:30		**HALL 2** **PLENARY SESSION Prof.Dr. Lubos Hes-Thermophysiological Comfort of Wetted Woollen Fabrics**	
14:45-15:45	**HALL 1** **Printing** **Chairman: Assoc. Prof. Dr. M. İbrahim BAHTİYARİ**	**HALL 2** **Fabric (Weaving and Knitting)** **Chairman: Prof. Dr. H. Ziya ÖZEK**	**HALL 3** **Fibre Production and Marketing & Carpet** **Chairman: Prof. Dr. Cem GÜNEŞOĞLU**
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15:00-15:15	5203-Evaluation of Some Physical Properties of Silk Fabrics Marble Printed with Natural Colorant /**Fatma Filiz Yıldırım** - Habibe Kahvecioğlu Sarı - Osman Ozan Avinç - Arzu Yavaş - Ece Kalaycı - Mustafa Çörekcioğlu	5335-Investigation of the Various Properties of Silk/Wool Blended Fabrics /Pelin Gürkan Ünal - Rıza Atav -Serap ÖZEL-**Göksun GÖZÜDOK**	5282-Wild Silk Fibres: Types, Properties and Utilization Areas /**Memik Bünyamin Üzümcü** - Müslüm Kaplan - İsmail Borazan
15:15-15:30	5270-Optimization of Process Parameters of Wool Printing with Natural Dyes /Martinia Glogar - Josipa Tancik - Iva Brlek - Ana Sutlovic - **Marijana Tkalec**	5306-Investigation of the Factors Affecting the Insulation Properties of Goose Down Clothing /Esra Dirgar - Oksan Oral - **Gonca Ozcelık Kayserı**	5160-Riafpa: An Interlaboratory Group for Testing Animals Fibers in Andean Countries /Diego Sacchero - **Edgar Quispe Peña**
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16:30-17:45	**HALL 1** **Tests and Quality Control** **Chairman: Prof. Dr. Lubos Hes**	**HALL 2** **Finishing** **Chairman: Prof. Dr. Onur BALCI**	**HALL 3** **Fashion, Design & Sustainability** **Chairman: Assoc. Prof. Dr. Gökhan Erkan**
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17:00-17:15	5252-Effect Of Composition on the Flammability of Zirpro Wool and Wool Rich Fabrics for Aircraft Seats /**Elif Kaynak** - Mustafa Erdem Ureyen - Adem Mutlu	5261-Investigation of Durabillity After Oxygen Plasma Application on Wool Fabric /**Mehmet Kılınç** - Dilek Kut	5108-Gots Organic Wool /**Elif Yarasik**
17:15-17:30	5336-A Study of the Contraction Behaviour of Woven Wool Fabrics /**Fatih Karaaslan** - H.Ziya Özek	5390-Investigation of Effect of New Generation Household Softeners on the Woollen Woven Garment /**Emel Doğru** - M. Ölmez - M. Erol - O. Balcı - K. Pektaş - C. Gunesoglu	5245-Washable Woolen Fabric Design /**Şule Sultan Uğur** - Nazlı Çağlar Cinperi - Ayşe Merih Sarıışık
17:30-17:45		5333-Shape Memory Polyurethane Based Nanocomposite Treatment for Easy Care Wool Garments /**Nazife Korkmaz Memiş** - Sibel Kaplan	5334-Design of Scarf Fabric by Using Different Chemical Behaviors of Silk and Viscose Fibers /**Serap Özel** - Özge Kuban
17:45-18:00		**CLOSING CEREMONY**	

International Congress on Wool and Luxury Fibres, ICONWOOLF2019 POSTER LIST 19 APRIL 15:45 - 16:15		
P - 01	APPLICATION OF A NEW CHEMICAL TO DIFFERENT FABRICS FOR FLAME RETARDANCY	Mehmet Tatlı - **Yasemin Korkmaz**
P - 02	CHITOSAN APPLICATION ONTO WOOL FABRICS BY SOL GEL METHOD AND ITS SURFACE CHARACTERIZATION	**Merve Türemen** - Aslı Demir
P - 03	EFFECT OF WASHING ON PROPERTIES OF WOOL FABRICS	**Serin Mezarcıöz** - R.Tuğrul Oğulata - Cemre Güneş Demirci
P - 04	ENVIRONMENT-FRIENDLY METHODS IN WOOL FINISHING	**Serin Mezarcıöz**
P - 05	MORPHOLOGICAL-GENETIC CHARACTERIZATION OF DOMESTIC SHEEP BREEDS' WOOL AND INVESTIGATION OF POSSIBILITIES OF THEIR USE IN TEXTILE CLOTHING PRODUCTION	**Emel Özkan Ünal** - M. İhsan Soysal - Rıza Atav - Pelin Gürkan Ünal - Muhittin Özder - Fulya Özdil - Sezen Arat - Serdar Genç - Raziye Işık - Ayşe Şen - Elif Geyik
P - 06	SHEEPSKIN CRAFT DESIGN IN TEXTILE : BETWEEN INNOVATION, AUTHENTICITY AND ECO-DESIGN	**Amine Hadj Taıeb** - Ikhlas Turkı - Slah Msahlı - Faouzi Saklı

Contents

PREFACE

Wool is a keratin-based protein fibre derived from the fleece of sheep and it has been used throughout history. Australia, New Zealand and China can be listed among the most important sheep breeding countries. In regions with hot arid climates fine and softer fleeces, that can be used in worsted fabrics, are produced, while colder wet climates (such as the United Kingdom) results in shorter and coarser fibres which are suitable for woollens. On the other hand, Mohair, Cashmere, Angora, Alpaca, Vicuna, Yak, Silk… fibres are exceptionally soft and lustrous, and they are found in limited regions around the world. These fibres are also produced in small quantities. The combination of these factors makes the finished products very expensive. These fibres provide high status to people having them in their clothes. Since synthetic fibres do not have the same potential, they are called "**Luxury Fibres**". Proteinous fibres are biodegradable which is a key factor for environmentally friendly production. Furthermore, they have high moisture management, good thermal insulation and high level of UV protection, antistatic and easy-care properties with soft handle. In today's conditions where competition with simple and ordinary goods becomes more difficult, luxury fibres such as cashmere, mohair, angora, alpaca and silk are opening new horizons. Turkey, which grows sheep in all provinces, Angora (Mohair) Goat and Angora Rabbit in Ankara and its vicinity, silkworm in provinces such as Bursa, Bilecik, Antakya, actually has a significant potential in the area of wool and various luxury fibres (mohair, angora, silk etc.).

As Tekirdağ Namık Kemal University, Corlu Faculty of Engineering, Textile Engineering Department, we are very pleased to organise this kind of international scientific congress about a very specific area such as wool and luxury fibres. This congress is also important in terms of being one of the few congresses in the world and the first congress in Turkey in the field of wool and luxury fibres. The processing of these protein-based textile raw materials with a very delicate structure requires considerable know-how and knowledge. Today, it is a well-known fact that innovative and sustainable production has become a necessity. With this congress, in which the eminent researchers from 17 different countries such as Australia to Peru as well as Turkey constitute the Scientific Committee, 40 oral presentations from 10 different countries are presented and more than 100 participants from various regions of the world attended, we aimed to share the latest innovations in the fields of wool and luxury fibres.

As wool and luxury fibres are very specific field of research, studies and articles on these fibres are very limited. This special congress aims to put together the recent studies from fibre to fabric on wool and luxury fibres. The content of this congress book includes;

- Fibre Production and Marketing
- Fibre Science and Technology
- Pretreatment
- Yarn Production
- Fabric (Weaving and Knitting)
- Dyeing
- Printing
- Finishing
- Carpets, Felts and Nonwovens
- Tests and Quality Control
- Fashion and Design
- Sustainability

I hope this congress book will be useful for readers from both academy, public institutions and industry.

On Behalf of Organizing Committee
Prof.Dr. Rıza ATAV

ORAL PRESENTATIONS

SECTION I:
FIBRE SCIENCE AND TECHNOLOGY

CREASE RECOVERY CHARACTERISTICS OF THE MARBLE PRINTED SILK FABRICS WITH SYNTHETIC INK BEFORE AND AFTER REPEATED WASHINGS*

F. F. Yildirim[1]*, H. K. Sari[2], A. Yavas[3], O.O. Avinc[3], E. Kalayci[3] And M.Corekcioglu[1]

Abstract

Ebru is an art thought to begin in Turkey. It is also called Marbling or Marble printing in English. In this study, "Ebru" is used for printing the pre-mordanted and un-mordanted silk fabrics with synthetic ink. The crease recovery characteristics of ebru printed then post-treated fabrics were investigated.

Key Terms

Synthetic ink, marble printing, Ebru, crease recovery, silk

1. Introduction

The origin of the "Ebru" word comes from Persian and means "cloudy". The Europeans generally name Ebru for papers as "marbled paper" or "papier marble" (Fig. 1) [1, 2]. In the past, marbled papers were used for book covers or signatures. The art was taken to Europe in 1600's and in France and Netherlands, "Ebru" had become very popular with their good quality [2, 3]. Between 17-18th century, "Ebru" lived its brightest period [2].

Figure 1: Ebru (Marbling) materials [4]

In this study, silk fabrics were printed using by "Ebru" marbling method with Pebeo Marbling Vermillion 02 Red ink. Primarily, silk fabrics were pre-mordanted with two chemical mordants and some fabric samples were left as a control fabric. Then, all un-mordanted and pre-mordanted silk fabrics were printed. Lastly, printed fabrics post-treated under various conditions. The crease recovery characteristic of the samples and the effect of the mordants on the marbled fabrics were evaluated.

2. Experimental

2.1. Materials

Un-mordanted or pre-mordanted 100% Silk plain woven fabrics were marble printed. Iron (II) sulphate ($FeSO_4 \cdot 7H_2O$ – Tekkim, chemical mordant), and potassium bichromate ($K_2Cr_2O_7$ – Tekkim, chemical mordant) were used as mordants for pre-mordanting process. Pebeo Marbling Vermillion 02 Red ink was utilized for marble printing process.

2.2. Procedures

100% silk fabric samples were pretreated with solution containing mordants with 1/40 liquor ratio in dyeing machine at 100°C in 60 minutes before Marble printing process. In pre-mordanting, 20% gallnut, %4 potassium bichromate and %4 iron (II) sulphate concentrations were used separately. After pre-mordanting, silk samples were washed and air-dried. Then, pre-mordanted samples and unmordanted control samples were printed with synthetic dye by using marble printing method. Before marble printing process, trgacant was prepared. Then 45 ml Pebeo Marbling Vermillion 02 Red synthetic dye were used for marble printing. Marble printing formula is given below (Table I):

Table I. Printing paste

Constituent	Amount
Pebeo Marbling Vermillion 02 Red dye	45 ml
Kitre (gall)	43 gr
Water	5 lt (pH 7.2)

After printing process, various post-treatments were carried out. First control fabric (C1) was the fabric immediately rinsed after marble printing, second control fabric (C2) was 24 hours stored and then rinsed marble printed silk fabric. Third control fabric (C3) was 1 month stored then rinsed marble printed silk fabric. Two samples (TF1 and TF2) were thermo-fixed at 130°C and 150°C, respectively, for 4 minutes. And the last two samples (SF1 and SF2) were steam-fixed at 102°C for 15 minutes and 30 minutes, respectively.

2.3. Analytical Methods

Crease recovery values of the samples were determined by using Shirley Crease Recovery Tester. Before crease recovery testing, printed samples divided into two pieces and one piece of the samples washed 5 times in the Wascator Standard Washing Machine. Crease recovery values of the washed 5 times, and unwashed samples were measured and compared.

3. Results and Discussions

Crease recovery is the ability to return its form when the fabrics are wrinkled under a certain pressure and afterwards the pressure effect is removed. Crease resistance refers to the resistance of a textile fabric against creases during use. When the crease recovery values of silk fabric samples were examined, it was observed that unwashed samples have higher crease recovery values than the washed samples. It shows that washed samples can be more easily wrinkled than unwashed samples. Crease recovery values of both washed and unwashed samples are given on Table II and Table III.

Table II. Crease recovery values of unwashed marble printed silk fabric samples

Samples	**CR (Crease Recovery Results) (Unwashed)**	
	Warp	**Weft**
Griege Fabric	136	134

	Without mordant		**Mordanted with potassium bichromate**		**Mordanted with gallnut**		**Mordanted with ferrous sulphate**	
Samples	**Warp**	**Weft**	**Warp**	**Weft**	**Warp**	**Weft**	**Warp**	**Weft**
C1 (marble printed, immediately rinsed**)**	142	146	132	144	143	144	136	142
C2 (marble printed, 24 hours storage at ambient conditions, rinsing)	139	143	137	144	129	143	131	131
C3 (marble printed, 1 month storage at ambient conditions, rinsing*)*	112	124	126	131	139	144	118	117
TF1 (marble printed, thermo fixation at 130°C for 4 minutes, rinsing*)*	136	137	131	133	122	134	125	129
TF2 (marble printed, thermo fixation at 150°C for 4 minutes, rinsing*)*	126	132	125	139	131	140	129	137
SF1 (marble printed, steam fixation at 102°C for 15 minutes, rinsing*)*	140	142	127	124	143	152	112	128
SF2 (marble printed, steam fixation at 102°C for 30 minutes, rinsing*)*	129	133	135	135	132	131	111	137

The greater the fabric density, the yarn twist and the fiber elasticity, the less the tendency to wrinkle, and the faster the wrinkle disappear [5]. As seen on Table II, mordants have no significant effect on the crease recovery properties of the marble printed silk fabric samples.

Table III. Crease recovery values of 5 times washed marble printed silk fabric samples

Samples	**CR (Crease Recovery Results) (Washed 5 times)**	
	Warp	**Weft**
Griege Fabric	128	126

	Without mordant		**Mordanted with potassium bichromate**		**Mordanted with gallnut**		**Mordanted with ferrous sulphate**	
Samples	**Warp**	**Weft**	**Warp**	**Weft**	**Warp**	**Weft**	**Warp**	**Weft**
C1 (marble printed, immediately rinsed**)**	134	142	129	142	129	138	137	139
C2 (marble printed, 24 hours storage at ambient conditions, rinsing)	131	139	135	138	125	136	142	143
C3 (marble printed, 1 month storage at ambient conditions, rinsing*)*	134	140	133	140	128	130	138	141
TF1 (marble printed, thermo fixation at 130°C for 4 minutes, rinsing*)*	133	142	132	131	126	130	143	145
TF2 (marble printed, thermo fixation at 150°C for 4 minutes, rinsing*)*	128	149	131	135	118	125	132	142
SF1 (marble printed, steam fixation at 102°C for 15 minutes, rinsing*)*	119	146	127	133	126	137	134	140
SF2 (marble printed, steam fixation at 102°C for 30 minutes, rinsing*)*	128	143	132	131	123	132	134	143

The high crease resistance of a fabric shows that the fabric has a low tendency to wrinkle. Since the yarns are free, the tendency to return to their original state after folding is high [5]. As seen on Table II and III, after repeated washing cycles, the crease recovery values of the samples decreased. Samples following repeated washings exhibited lower crease recovery values and this indicates that these samples exhibited higher tendency to the wrinkle than that of unwashed samples. Wrinkle tendencies of treated samples are given on Fig. 2-8.

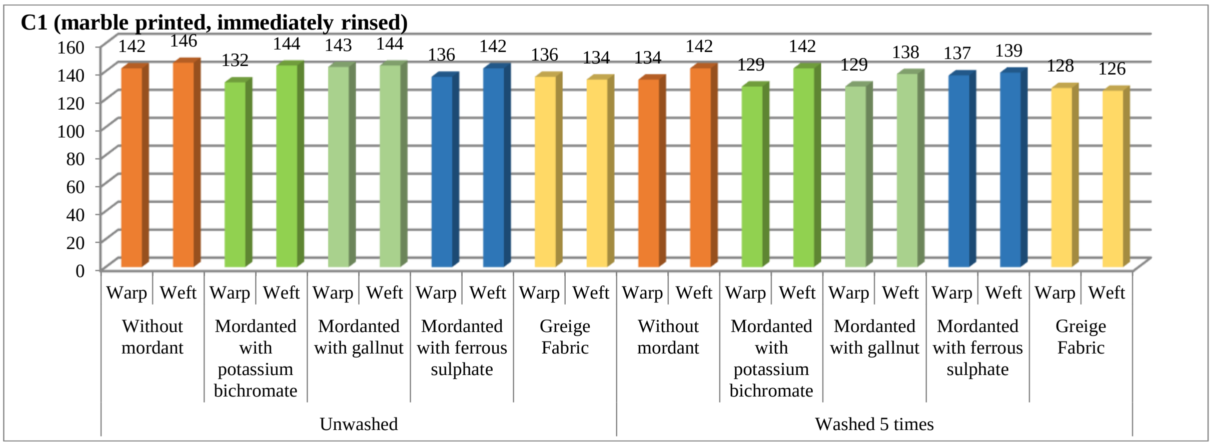

Figure 2: Crease recovery values of unwashed and repeated washed control fabric (C1)

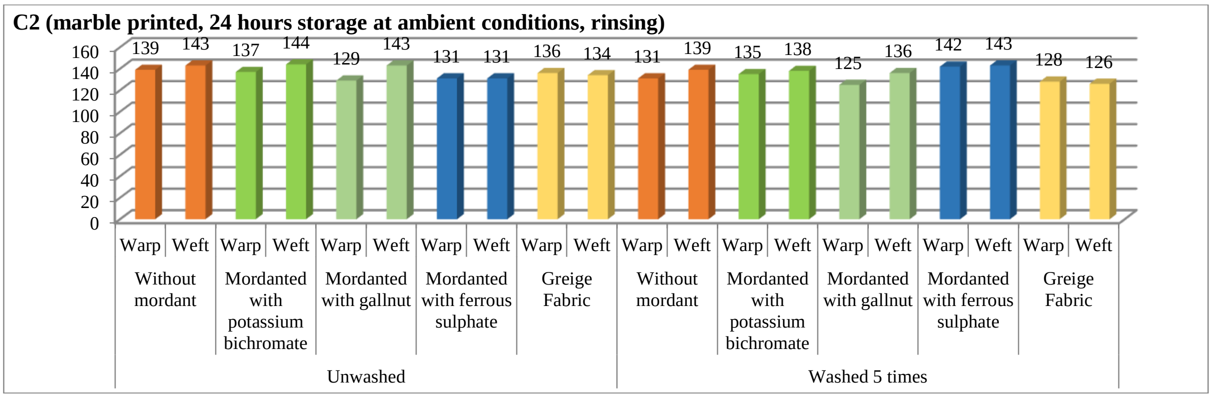

Figure 3: Crease recovery values of unwashed and repeated washed control fabric (C2)

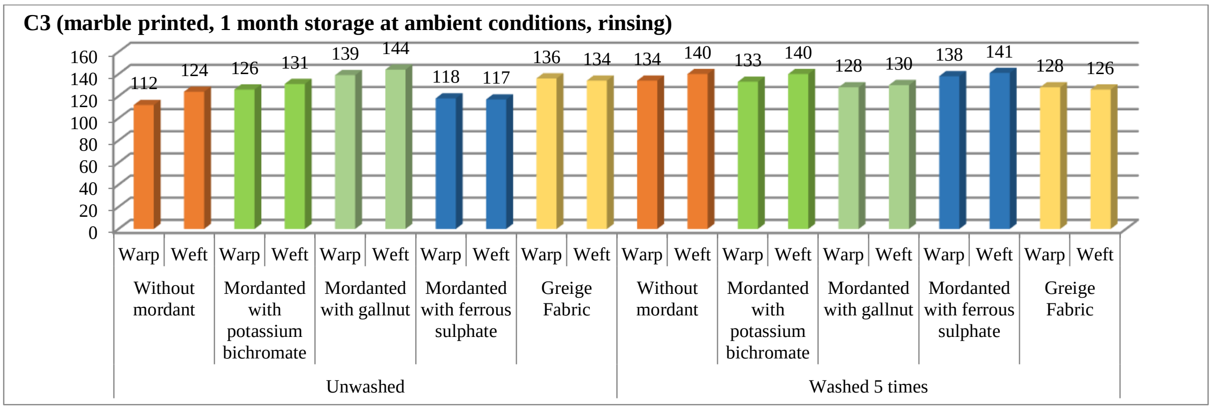

Figure 4: Crease recovery values of unwashed and repeated washed control fabric (C3)

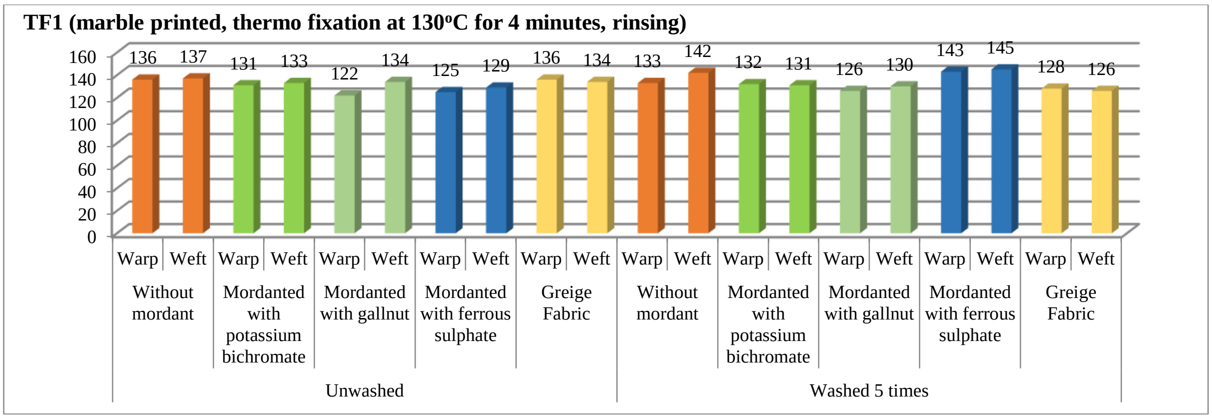

Figure 5: Crease recovery values of unwashed and repeated washed thermofixed fabric at 130°C (TF1)

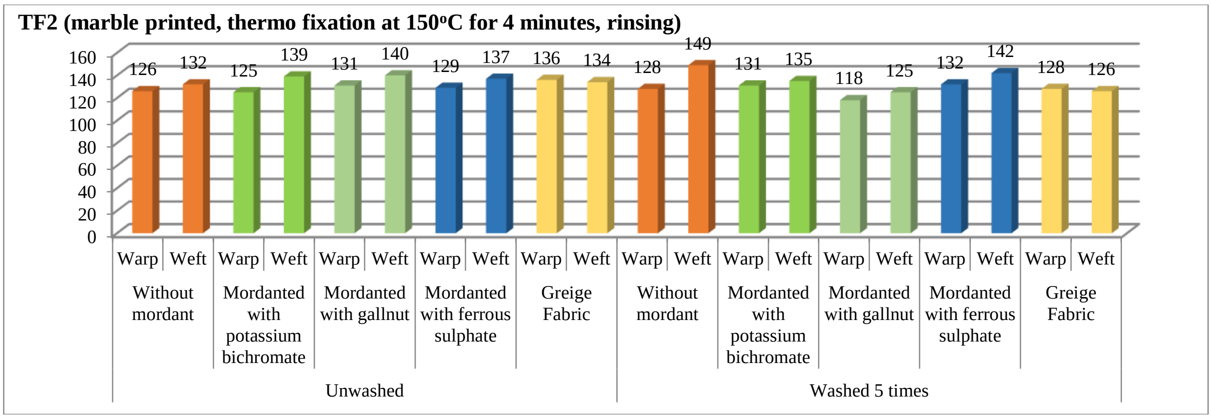

Figure 6: Crease recovery values of unwashed and repeated washed thermofixed fabric at 150°C (TF2)

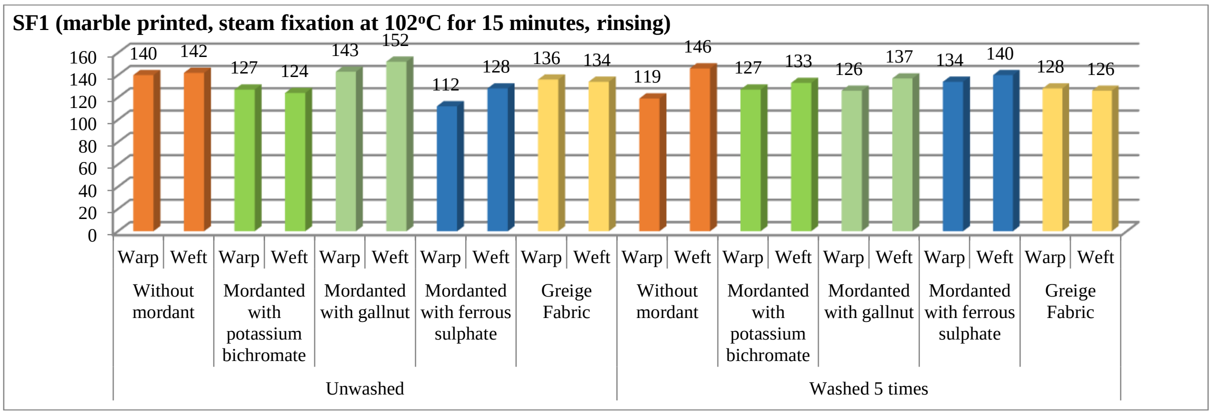

Figure 7: Crease recovery values of unwashed and repeated washed steam fixed fabric for 15 minutes (SF1)

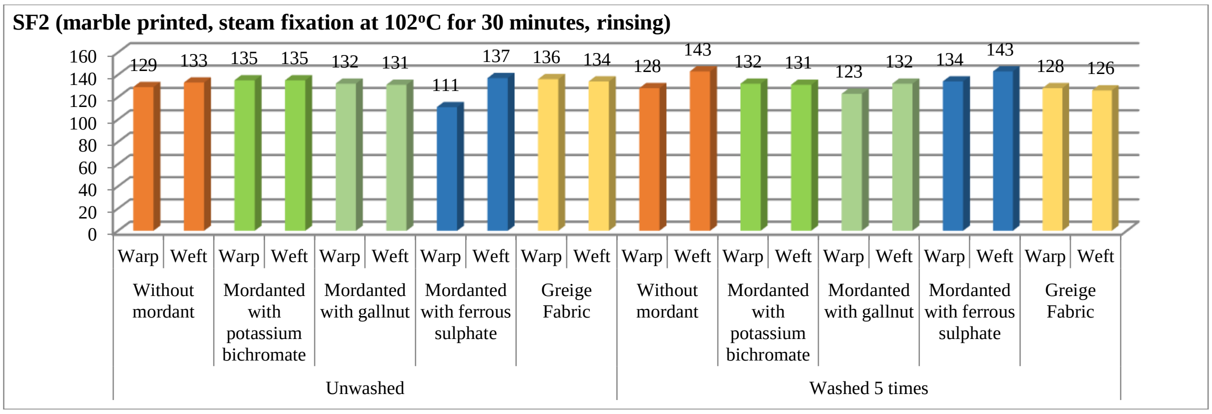

Figure 8: Crease recovery values of unwashed and repeated washed steam fixed fabric for 30 minutes (SF2)

As seen on above Figures, generally warp direction of the samples have lower crease recovery values than those of weft directions. However, it is right point to mention that there is no significant difference between them. Samples pre-mordanted with potassium bichromate and ferrous sulphate exhibited higher crease recovery values, especially after thermofixing and steam fixing post treatments. However, greige fabrics showed decreasing tendency.

4. Conclusions

In this study, silk fabrics printed using by "Ebru" marbling method. The crease recovery characteristic of the samples and the effect of the mordants and post-treatment type on the marbled fabrics were examined. Before testing, printed samples divided into two pieces and one piece of the samples washed 5 times and one piece of the samples left as unwashed. Crease resistance characterizes the resistance of a textile fabric against creases. When the crease recovery values of silk fabric samples were investigated, it was observed that unwashed samples have higher crease recovery values than the washed samples. It indicates that washed samples can be more easily wrinkled than that of unwashed samples, except ferrous sulphate pre-mordanted samples.

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