

Ornamentation of Lithuanian Ethnographic Home Textiles

DOI: 10.5604/12303666.1215534

Kaunas University of Technology,
Faculty of Mechanical Engineering and Design,
Department of Materials Engineering,
Studentų 56, LT-51424 Kaunas, Lithuania,
*E-mail: egle.kumpikaite@ktu.lt

Abstract

In the literature analyzed there are no interdisciplinary researches that could combine both ethnographic and technological investigations of Lithuanian folk home textiles. Therefore, the goal of this article is to make a complex investigation of Lithuanian ethnographic home textiles analysing its patterns, weaves, colour repeats and weave symmetry groups. 849 multipurpose ethnographic home textile fabrics (bedspreads, pillow-slips, slip-covers, towels, tablecloths, pieces of different purposes, curtains, bed sheets) from 5 Lithuanian museums were analysed. In Lithuanian ethnographic home textiles six different types of patterns were distinguished, of which fancy, motley, checked and plane fabrics were the most popular. In the home textiles analyzed there were found 22 different types of weaves. Checked twill, plane and overshot four-harness weaves were the most popular. While analysing symmetry groups of colour repeats and weaves according to classical principles of ornamentation, six symmetry groups were distinguished. Although patterns and weaves have the same symmetry groups, their distribution is different in both cases.

Key words: ethnographic home textiles, ornamentation, pattern, weave, symmetry group.

other fibrous materials were already used in the Neolithic period. In the 19th century and earlier, wool and flax were used in parallel in Lithuania as well. Since the beginning of the 20th century materials such as cotton and silk-wool were purchased [1]. Silk-wool is the folk name for bought, shiny wool of high quality, similar to silk.

The peculiarities of residential interiors, especially in towels and bedspreads, reflect the home textiles of different ethnographic areas [2]. Bedspreads, in which woollen yarn was used, were more valuable. Tow and linen bedspreads are considered to be purer [3]. Colored two-harness bedspreads of the 19th century are very diverse and rich in their weaving pattern. The most common combination consists of 3-4 colors, with the background consisting of two contrasting darker tones with accents of lighter tones. Specifically in Samogitia the most common bedspreads are vertically striped, woven from thick woollen yarn. Another popular variant of bedspreads is with warp from cotton yarn and weft from woollen yarn. There are also some bedspreads with transitional colour tones that are merged into another. In such bedspreads not many colours are used [1, 3 - 6].

Two-harness bedspreads are similar to the 4 - 8 harness twill variety with respect to colour and check combinations. They differ from two-harness ones by more variable checks [3].

In Lithuanian bedspreads orange, light blue colors can almost never be found,

while in Polish checked bedspreads the pattern mainly consists of these two colours. Belorussian checked bedspreads are closer to Lithuanian ones in their design. There is a similar range of colours, with just the proportions of checks being different. Belorussian bedspreads typically have small checkering, while Lithuanian ones do not have small checks. The most popular colour combinations in Latvia are red and yellow, red and orange, while in Lithuania these combinations are very rare [3].

At the end of the 19th century and beginning of the 20th century, the patterns of bedspreads became more complex, combining 2, 3 & 4 colours. More advanced bedspreads are quite colourful, combining 2 - 8 colours, with eight or more harness bedspreads usually woven from two colors: lighter in the background and darker in the pattern [1, 4 - 6].

The pick-up technique was also applied quite often for bedspread weaving. Pick-up bedspreads are usually two-colored, with a contrasting combination of colours [4, 5].

Overlaid bedspreads are more colourful than pick-up ones. They can be composed of many colours: the background, checks and pattern. Pattern and background colours combine in a contrasting way. In the dark background, lighter checks were woven and vice versa. For overlaid patterns bright colours were used [4].

Towels are considered to be the most beautiful "white" fabrics because of pat-

■ Introduction

In the 19th – 20th centuries all the fabrics used in home textiles, such as bedspreads, slip-covers, pillow-slips, bed sheets, blankets, towels, tablecloths and clothing originally were woven at home from farm manufactured raw materials.

The main Lithuanian folk materials were flax and wool, sometimes hemp fibre. According to archaeologists, wool and

tern variety. They reveal the development of weaving techniques and designs. The oldest towels of the beginning of 19th century are four-harness flax, very long and narrow [1, 6]. Subsequent towels show great technical improvement and bigger variety of patterns. In order to highlight the pattern, bleached and unbleached flax threads were used. At the beginning of the 20th century white cotton threads started to be used for weaving, with flax just in weft. In the 4th decade of the 20th century the pick-up technique spread into towel weaving [1, 2, 6, 7].

According to tradition, the home table was always covered by a tablecloth, for every day use – simple, for guests – decorative. The patterns of tablecloths are simpler than of towels; they have less variety. At the beginning of the 19th century, flax tablecloths were used, and later cotton threads for the warp [1, 7, 8].

In Lithuania, pillow-slips were white, woven from flax or tow, and also checked from flax, cotton or tow threads. The ends of white pillow-slips were woven in the pick-up technique, and later woven using red industrial cotton thread called „zhichkai“. Sometimes linen handmade or bought lace was sewed in. Checked slips were woven for pillows and covers. A combination of blue and white or red and white colours was the most popular [1, 5 - 7].

The ornaments of textiles, as well as pottery, woodcarving and other folk arts can be classified according to the principles of classical ornamentation, depending on the fabric pattern symmetry groups. Woods [9] states that any ornament, including woven, can be described by four symmetry operations: translation, rotation, reflection and glide-reflection. Translation – the motive is repeated in equal intervals in one direction, while motif orientation is the same. Rotation – the motif is repeated by rotating it at regular intervals about an imaginary fixed point (the center of rotation). Reflection – is the mirror motif repetition of a certain axis. Glide-reflection – this is the combination of reflection and translation symmetry operations around the modified reflection axis. Woods [9] and Hann [10], analysing the different patterns, showed that there are 17 different symmetry groups formed by points spaced in parallel lines that can make 5 geometric shapes: the parallelogram,

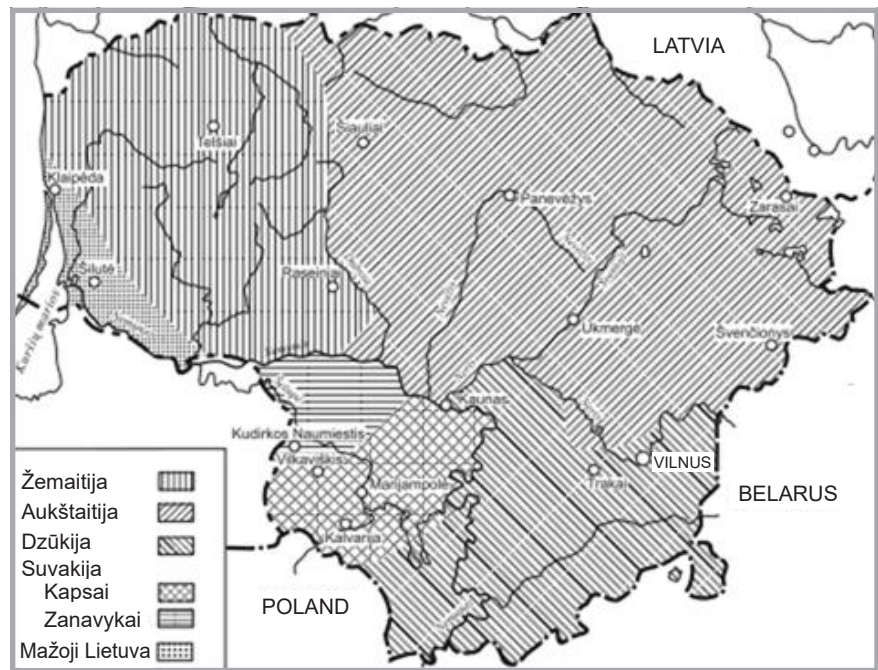


Figure 1. Ethnographic region map of Lithuania according to Baltic Clothing Atlas.

rectangle, square, diamond or hexagonal [11]. Woods offered a two-dimensional pattern and motif classification as well as a marking system defined by geometric rules, from which he introduced finite and one-directional ornaments, whose structure is based on the theory of crystallography. Hann improved this theory [10].

Washburn and Humphrey [12] highlighted the same pattern segment type of transformation: translation, rotation, reflection and glide-reflection. They identified 7 one-directional symmetry groups of ornaments analysing woven and non-woven patterns.

Pick-up and overshot folk fabrics were studied by Lithuanian technologists Kazlauskienė, Neverauskienė and Milašius [13]. Referring to the method suggested by Woods and developed by Hann, they also presented their own system of classification which is applied to woven ornaments and based on various groups of symmetry and operations with matrices. Katunskis, Milašius and Taylor [14] also designed software to create a basis for a database which is adjusted to analyse folk fabric ornaments, presenting the ornament structure and methods of its creation.

Milašius, Neverauskienė, Katunskis and Kazlauskienė [15] presented an adaptation of the Woods-Hann classification

and system of ornament creation for patterned woven fabrics. They established that 12 out of 17 possible symmetry groups are used in Lithuanian woven fabrics. Zdanavičiūtė, Milašius, Katunskis [16] created software to preserve and analyse pick-up sashes and overshot fabric ornaments, which enabled to analyse the peculiarities of ornament symmetry as well as to look for a relationship between the culture's mentality and technologies.

In the literature reviewed ethnographic fabric weaves, colours and patterns, as well as a variety of ornaments in different countries were discussed widely. However, there are no interdisciplinary researches that could combine both ethnographic and technological investigations of home textiles. Therefore the goal of this article is to make a complex investigation of Lithuanian ethnographic home textiles by analysing their patterns, weaves, colour repeats and weave symmetry groups.

Materials and methods

Research included analysis of 849 multipurpose ethnographic home textile fabrics: 168 bedspreads, 144 pillow-slips, 16 slip-covers, 225 towels, 178 tablecloths, 61 pieces of different purposes, 4 curtains, and 53 bed sheets. All fabrics were from 5 museums' textile collections: 275 from the Open Air Museum

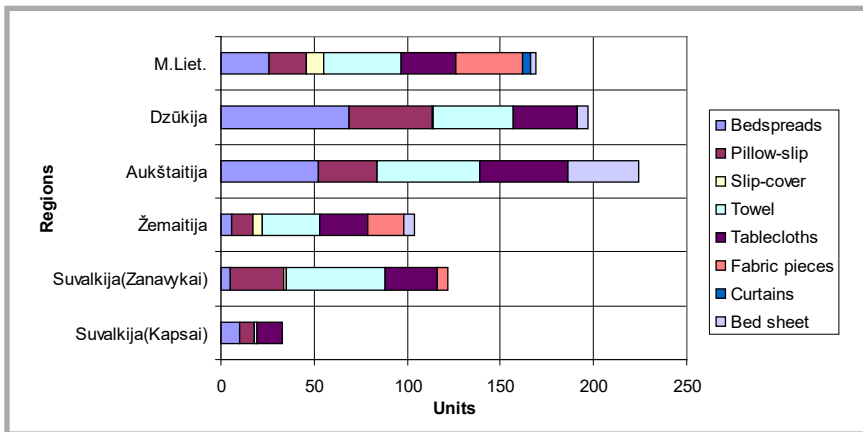


Figure 2. Territorial distribution of fabrics analyzed.

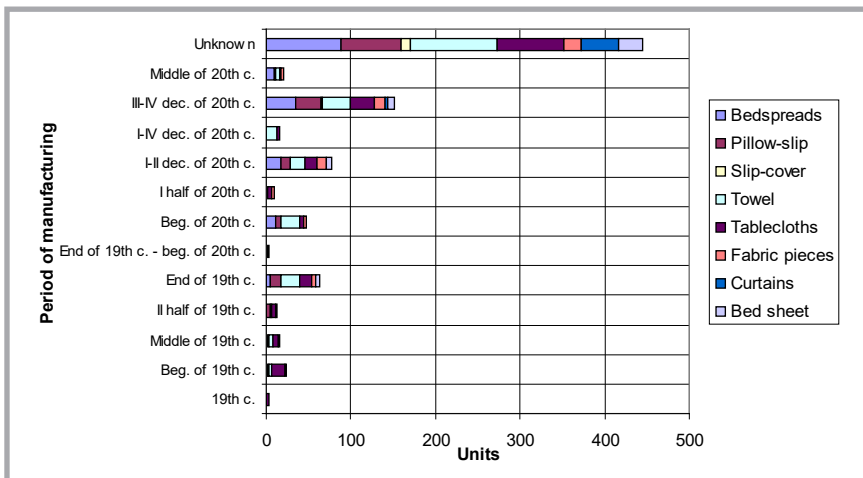


Figure 3. Chronological distribution of fabrics analyzed.

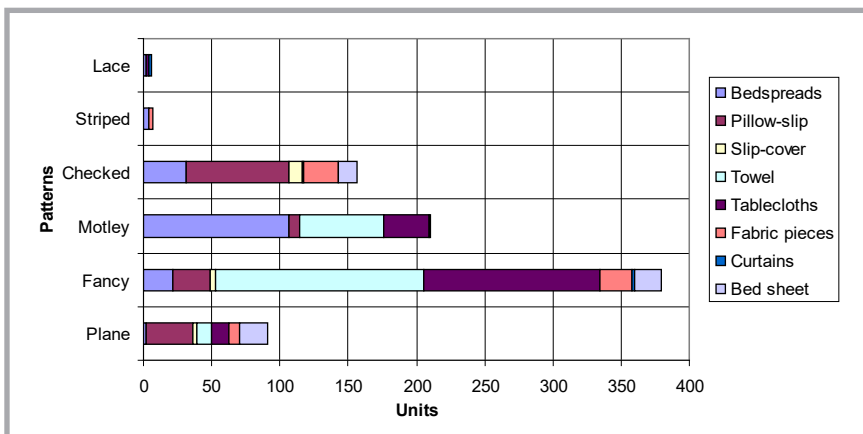


Figure 4. Distribution of fabrics according to patterns.

of Lithuania (LLBM), 240 from the National Museum of Lithuania (LNM), 222 from the Lithuanian Art Museum (LDM), 100 from the Silute Museum (SM), and 12 from the Minor Lithuania History Museum (MLIM).

All the fabrics were collected from 6 different regions of Lithuania. A regional

map is published in the Baltic Clothing Atlas (IEAO), where the Minor Lithuania region is separated, and Suvalkija is divided into „Kapsai“ and „Zanavykai“. A map of ethnographic regions is shown in Figure 1.

A territorial distribution of the fabrics analysed by ethnographic region is

shown in Figure 2. As can be seen from the diagram, most fabrics are from Aukštaitija (224), Dzūkija (197) and Minor Lithuania (169). A few fabrics are from Suvalkija (Zanavykai) (122 fabrics) and Samogitia (104). The smallest part of the fabrics analysed was from Suvalkija (Kapsai) (33 fabrics). The ethnographic region was indicated by the fabric weaving location (region, district and village). All fabrics were woven from the 19th century to the 1st half of the 20th century. A chronological distribution of the fabrics according to the weaving period is shown in Figure 3. Most of the fabrics were woven in the III - IV decades of the 20th century (151), the I - III decades of the 20th century (77), at the end of the 19th century (63 fabrics) and at the beginning of the 20th century (24). A few fabrics (10 - 24) were woven in other periods: at the beginning of the 19th century (24), in the middle of the 20th century (21), in the middle of the 19th century (16), the I - IV decades of the 20th century (15), the 2nd half of the 19th century (13), and the 1st half of the 20th century (10). Many of the fabrics analyzed were of an unknown weaving period. Also the diagram shows that the periods of fabric manufacture are very different – for some concrete decades are presented, while for others they are abstract, i.e. the beginning of the century, middle or 1st half. This is because in some cases the presenters do not know the weaving period of the fabric exactly. In some cases, they just have information that somebody's mother, aunt or grandmother wove the fabric, know just the date of birth or date of death of the weaver, and sometimes it is very hard to define a period of weaving. In these cases either the exhibit's period is indicated abstractly or designated 'unknown'.

The study determined the colour repeats, patterns, weaves and symmetry groups of ethnographic home textile. All of these parameters were determined in two steps: First, all of the fabrics were photographed and their parameters established from the images, thread count and analysis of their interweaving from the image on a computer screen. Then unclear fabrics were selected and reviewed again after visiting a relevant museum, for which a more detailed review of experimental-analytical methods was applied, where a needle, counting glass and metric ruler were used.

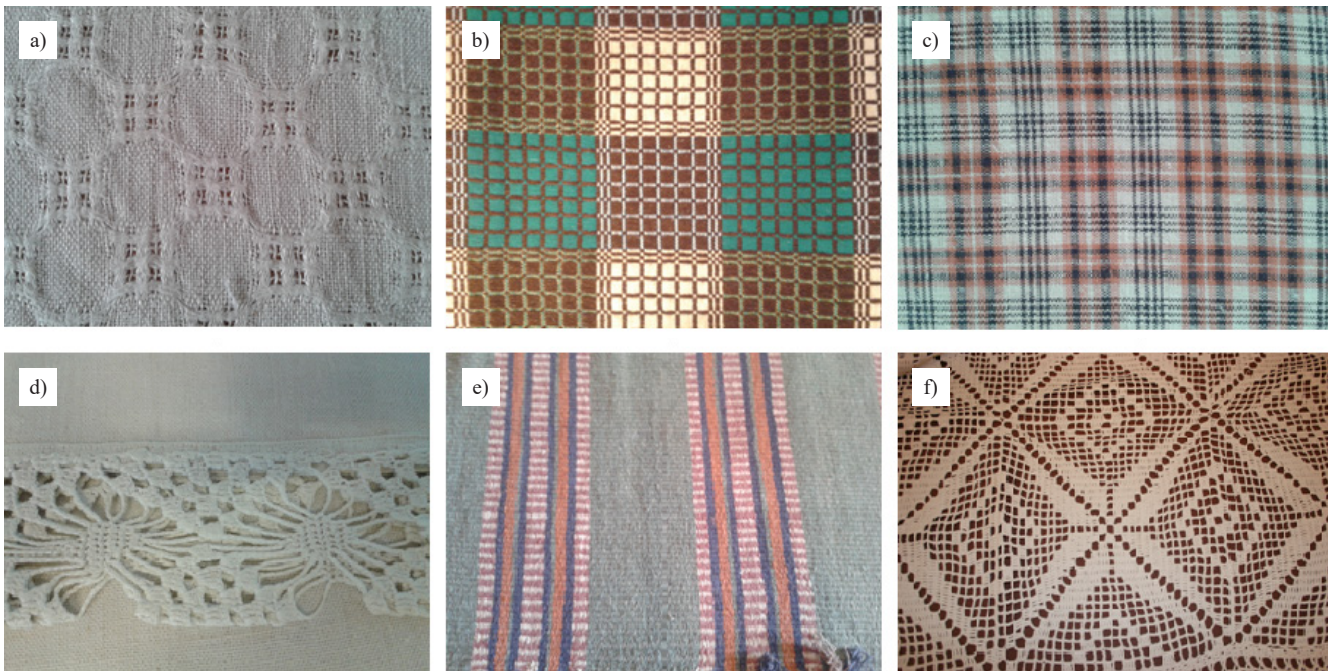


Figure 5. Examples of every group of fabric pattern: a – fancy tablecloth LNM EMO 4455, b – motley bedspread LNM EMO 3959, c – checked slip-cover LNM EMO 2399, d – plane bed sheet LNM EMO 7711, e – striped bedspread LDM LA 430, f – lace bedspread SM LM324.

Results

First the warp and weft repeats were defined, and according to them - fabric patterns. 6 types of patterns were distinguished: plane, fancy, motley, checked, striped and lace. The plane patterns were without any surface relief, being of mostly plain, satin and elementary twill fabrics of one colour. The patterns attributed to the fancy group were made not from colourful threads, but distinguished by the peculiar relief of the fabric weave. In the motley fabric, the pattern was made combining weave and colourful threads. For the warp and weft directions using coloured threads, a checked pattern was created, and in the striped pattern different colour threads were used in one direction. Also there were some knitted crocheted items.

Distribution of the fabrics investigated according to fabric pattern is shown in **Figure 4**. Most of the fabrics were woven with fancy pattern (379 units), fewer with a motley (210 units), checked (156 units), and plane (91 units) pattern. There were just 6 and 7 striped and lace patterns. It can also be seen that not all patterns were used in fabrics of all purposes. For example, just bedspreads, tablecloths, curtains were of lace; and only fabric pieces and bedspreads striped. However, there were no slip-covers, curtains and bed sheets with motley, and no towels or curtains were

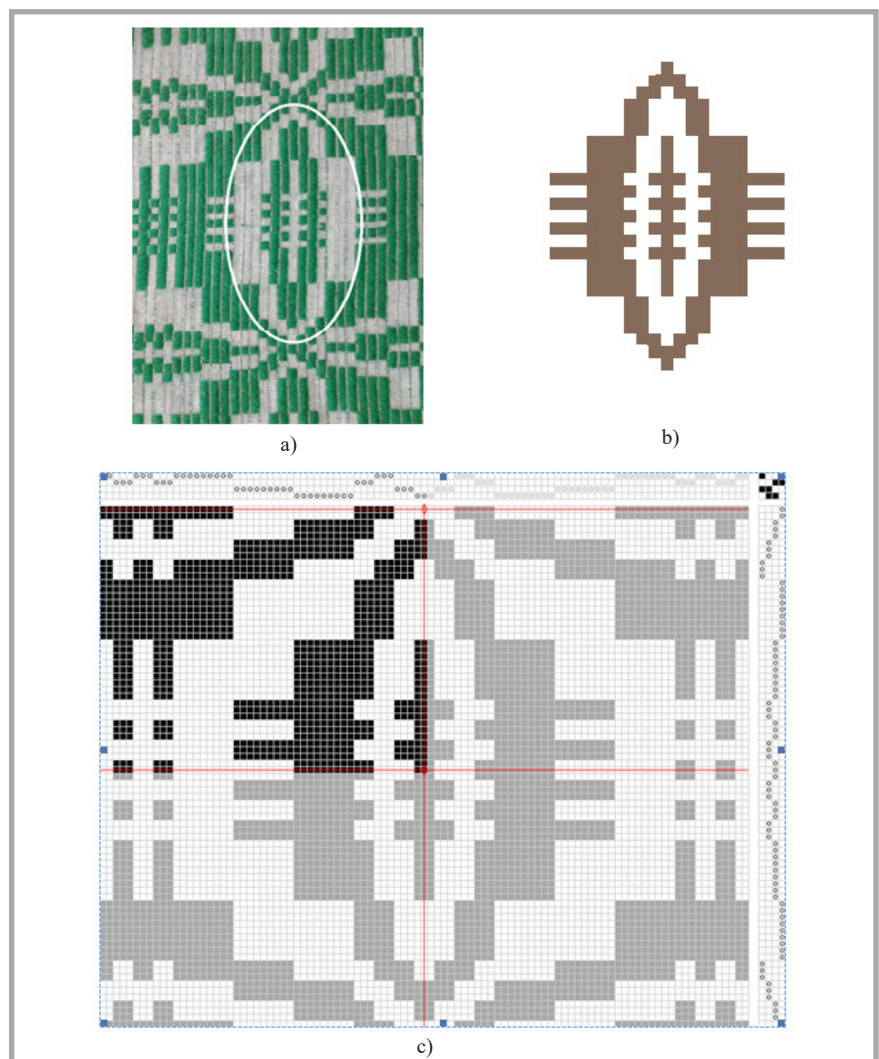


Figure 6. Cucumber: a - view of the fabric, b - element of the pattern, c - ornament.

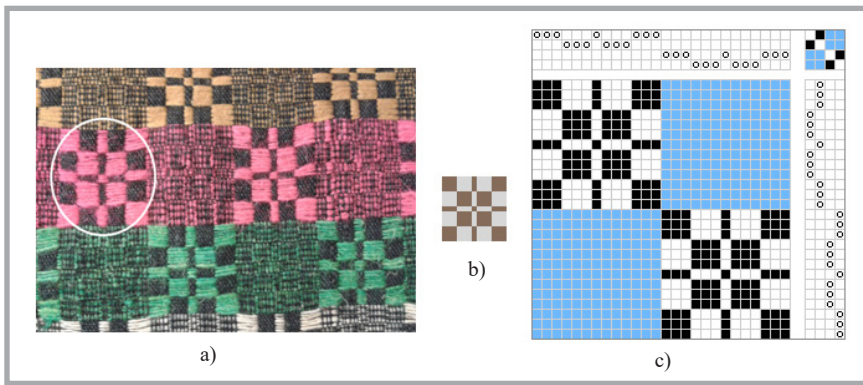


Figure 7. Cat-foot: a – view of the fabric, b – element of pattern, c – ornament.

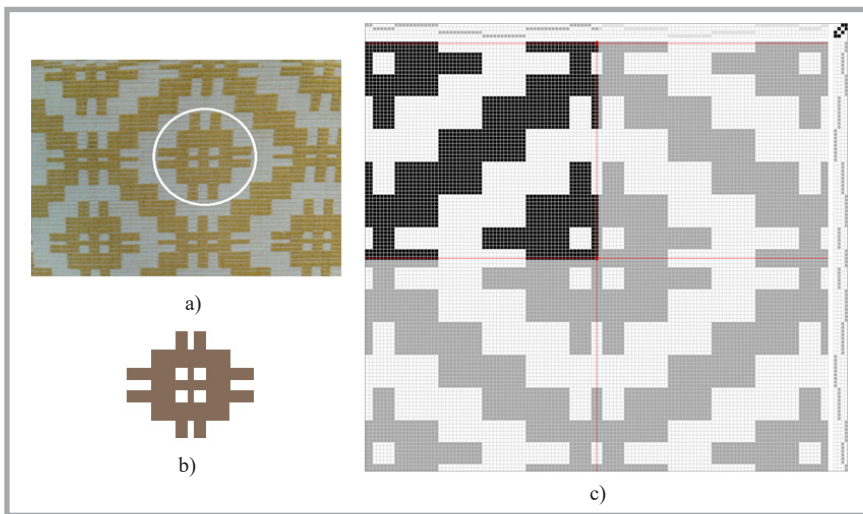


Figure 8. Harrow: a - view of the fabric, b – element of pattern, c – ornament.

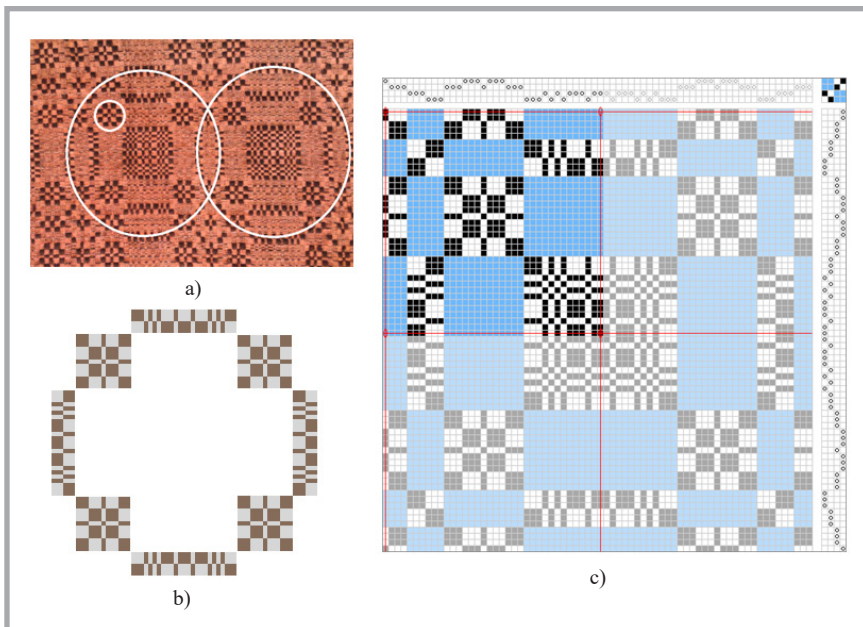


Figure 9. Circle: a - view of the fabric, b – element of pattern, c – ornament.

woven in a checked pattern. Items of all purposes were only woven in a plane and fancy pattern. Examples of every pattern group are shown in *Figure 5*.

Plain, twill, overshot, pick-up and overlaid weaving techniques of bedspreads were the most popular in Lithuania, while the checked technique, which was more

used for towels and tablecloths, was less widespread [1, 3 - 6].

Separate elements associated with rural human life play an important role in the ornaments of fancy and motley fabrics: cats-foot, rake, harrow, cucumbers, leaves, clover, intersecting circles and so on. Different combinations of these elements were also frequent. Some of the pattern samples are shown in *Figures 6 - 9*.

Old bedspreads of the beginning of the 19th century were woven using the simple two-harness technique, where a simple pattern is created using colours. The dominant patterns are differently sized checks and strips. Twill weave bedspreads woven with 4 - 8 harnesses are similar to two-harness bedspreads in the colour and check combination [1, 3 - 6].

Bedspreads from the end of the 19th century to the beginning of the 20th century were woven using four-harness, eight-harness and multi-harness overshot techniques. The simplest composition of four-harness overshot fabrics was made from check groups distributed in a chessboard order or one perpendicular to the other to form larger squares. More complex bedspread patterns were created from small checks, rhombs, circles and cats-foot motifs [1, 4 - 6]. Petrulis's and Petrulyte's study [17] also confirms the common occurrence of the cats-foot motif in Lithuanian overshot fabrics of the 20th century.

Pick-up bedspreads are distinguished by a complex composition of stylised floral and geometric shapes resembling stars, snowflakes and similar patterns. There are many bedspreads woven using the so-called pot motif. Pots with stylised flowers in them are arranged in horizontally-striped checks [1, 6].

The patterns of the beginning of the 19th century were very simple: various checks, columns and stripes. Towels of the beginning of the 20th century of simpler pattern were woven with the four-harness overshot technique. More complex patterns were woven with eight, twelve, sixteen or more harnesses with the checked technique. The main motifs of towels are geometrical, rhythmically repeated throughout the fabric.

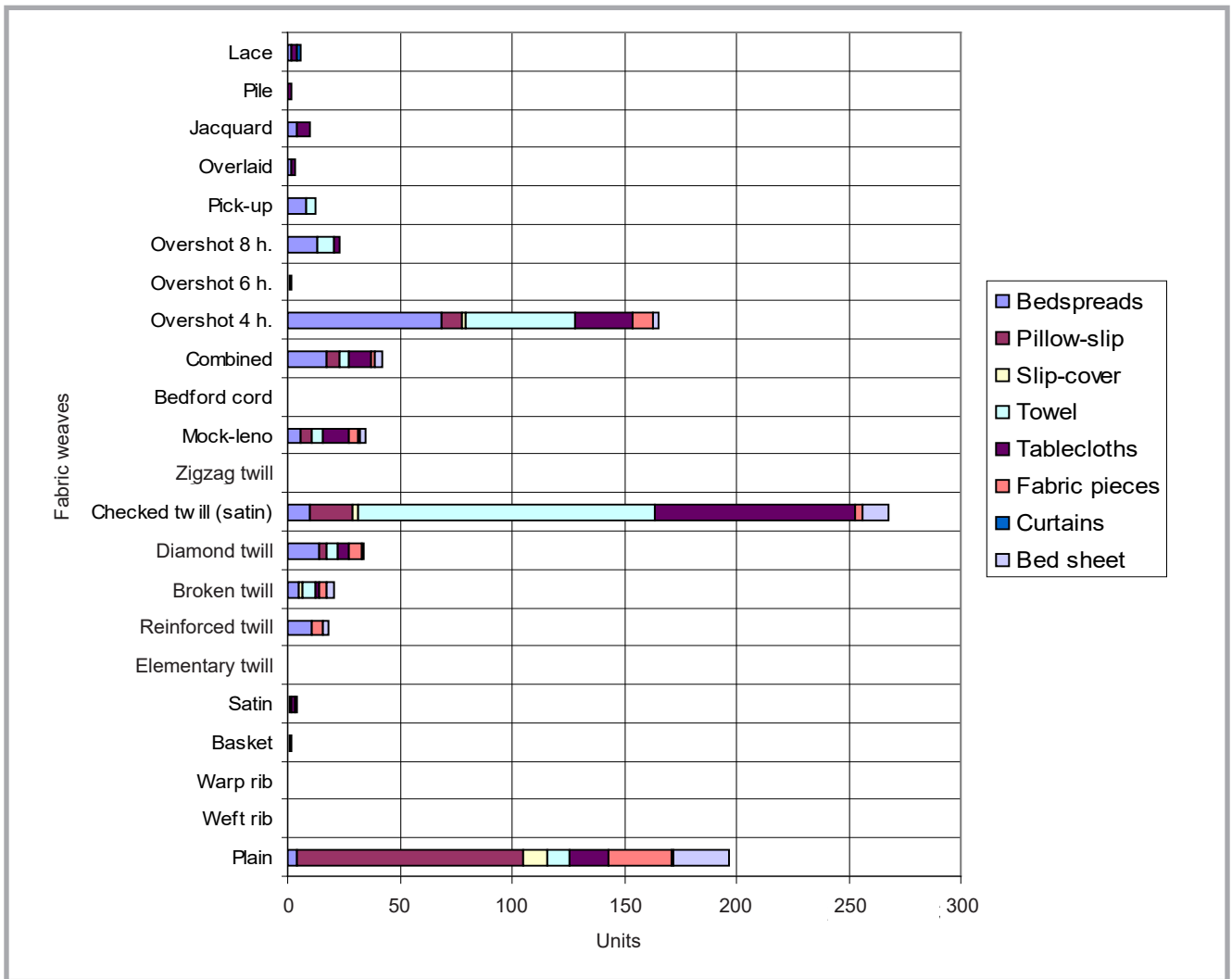


Figure 10. Distribution of weaves in fabrics analyzed.



Figure 11. Examples of main weaves of folk textiles: a – checked twill bedspread LDM LA 507, b – plain slip-cover LDM LA 5169, c – overshot 4-harness bedspread LNM EMO 4482, d – combined bedspread LNM EMO 2914, e – mock leno tablecloth LDM LA 1226, f – diamond twill towel LNM EMO 8240.

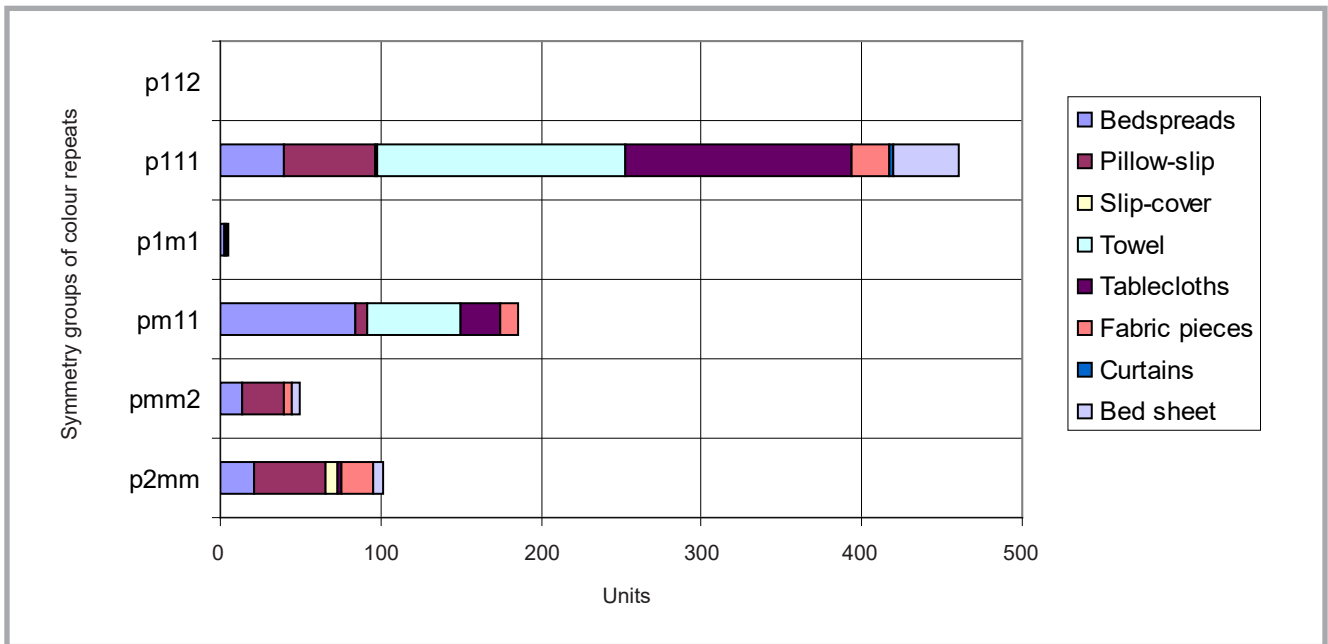


Figure 12. Distribution of colour repeats of symmetry groups.

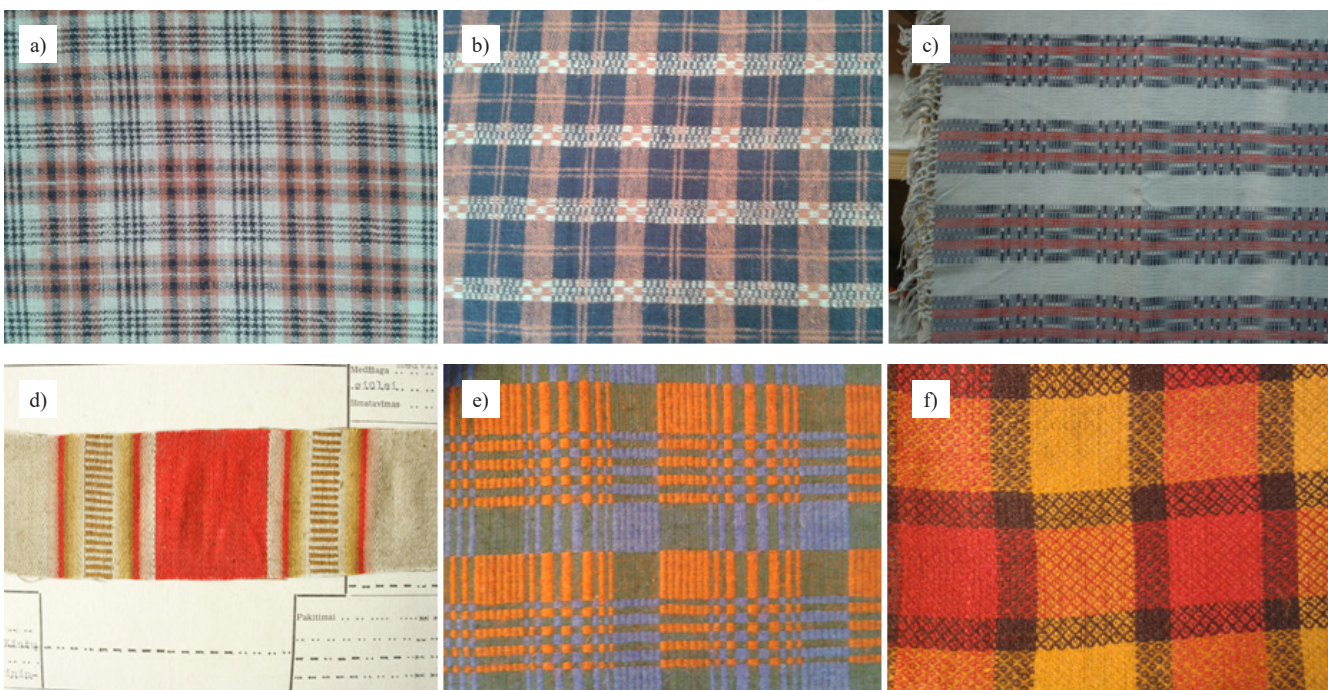


Figure 13. Examples of colour repeats of symmetry groups: a – p2mm slip-cover LNM EMO 2399, b – pmm2 slip-cover LNM EMO 2400, c – pm11 tablecloth LBM 9484, d – p1m1 fabric piece LBM 45282, e – p111 bedspread LNM EMO 2544, f – p112 bedspread LNM EMO 7585.

Patterns consist of various size checks and their combinations, longitudinal and transverse columns, serpentine, rosettes, stars etc. In the towels selected floral and animal motifs dominate, distributed in the fabric quite rarely. Moreover some motifs of lilies, clovers, cornflowers and pots were distinguished. They are often combined with animal motifs, such as roosters, doves that symbolizes peace, and the happiness of the family [1, 4 - 6].

Tablecloths have geometric patterns: rhombs, small or big checks, sectional circles and so on. Tablecloths have bigger motifs than towels because of the bigger surface [1, 7, 8].

The distribution of fabric weaves is shown in **Figure 10**. As can be seen from the chart, the most popular were checked twill (satin) (268 units), plain (197 units) and four-harnessed overshot (165 units)

weaves. Fabrics of all purposes were woven using these weaves. There was less combined (42 units), mock-leno (35 units), diamond twill (34 units), eight-harness overshot (23 units), broken twill (21 units), reinforced twill (18 units), pick-up (12 units) and jacquard (10 units) weave fabrics. There were just a few pieces of fabrics of different weave common for just one or a few purposes. Bedspreads have the largest va-

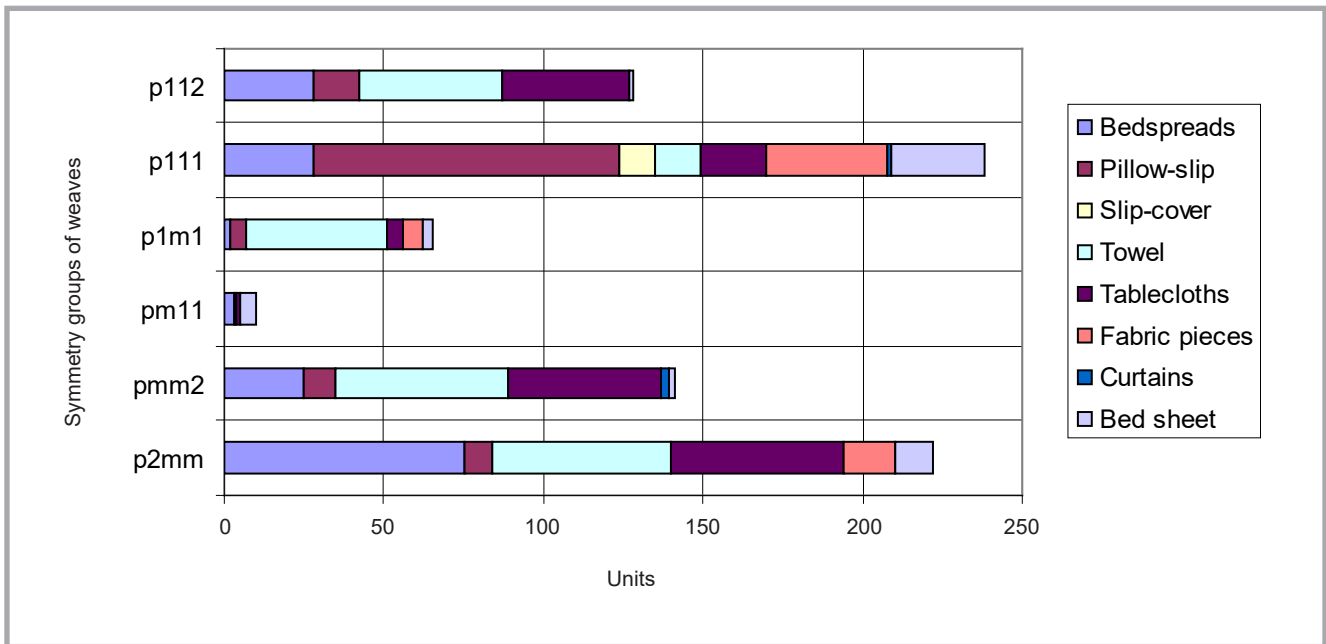


Figure 14. Distribution of weave symmetry groups.

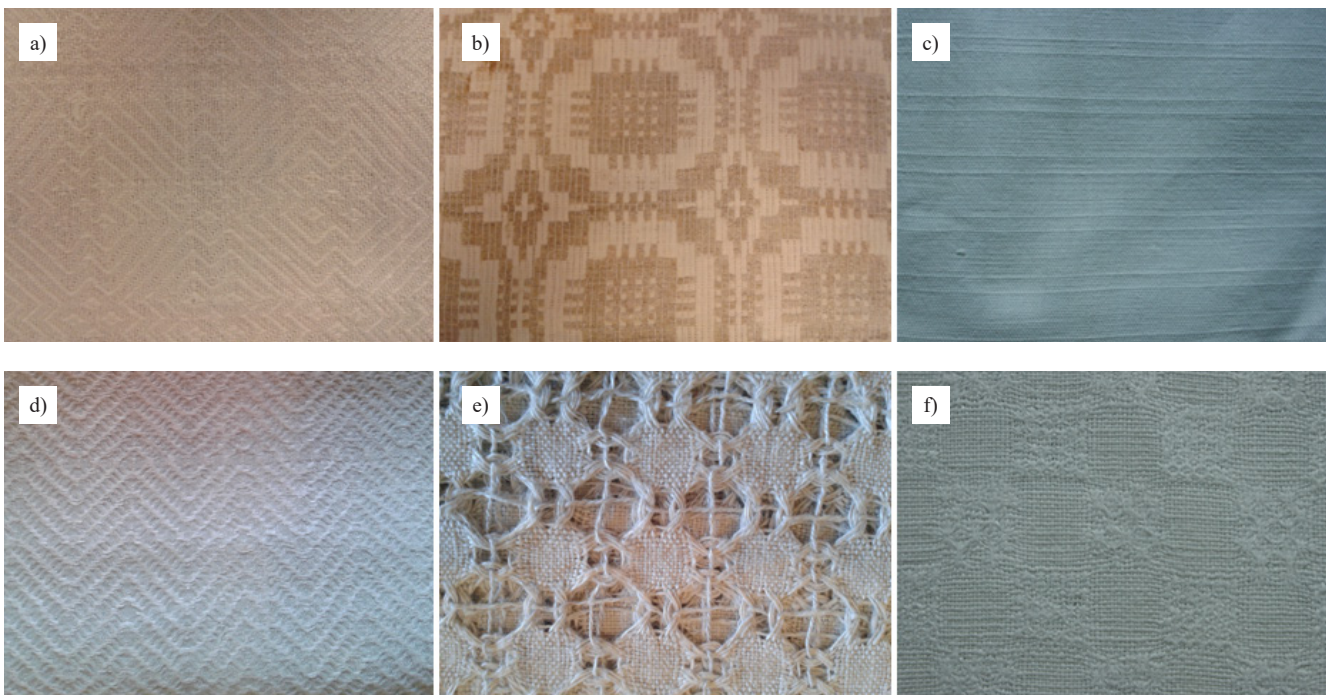


Figure 15. Examples of weave symmetry groups: a – p2mm towel LNM EMO 2101, b – pmm2 towel LNM EMO 2473, c – pm11 tablecloth LBM 34911, d – p1m1 towel LDM LA 2988, e – p111 tablecloth LDM LA 632 f – p112 tablecloth LBM 9732.

riety of weaves, with towels usually having checked twill (satin) and four-harness overshot weaves. Examples of the most popular weave fabrics are shown in *Figure 11*.

When the colour repeats, patterns and weaves of ethnographic home textiles were established, an analysis of the pattern and weave symmetry could be made. Symmetry groups were divided according to Woods-Hann methodology [9].

The distribution of pattern symmetry groups is shown in *Figure 12*. Asymmetrical (460 units) patterns, i.e. patterns of the p111 group, are the most common for colour repeats of pattern symmetry groups. There was significantly less of pm11 fabrics (186 units). A horizontal symmetry axis is common for the patterns of this group. Furthermore there were just a few two-directional symmetry group p2mm patterns (102 units). Two orthogonal symmetry axes are de-

finied in these patterns, and their pattern is the same in both directions (vertically and horizontally). There were significantly fewer (50 units) pmm2 symmetry group patterns, whose symmetry axis is also orthogonal, although segments of the ornament can differ in both directions. Therefore these ornaments are assigned to the one-directional symmetry group. There were just a couple of fabrics of the other two groups (p1m1 and p112). It is common for the p1m1 group

to have a vertical symmetry axis, and in the p112 group for the axis to move horizontally, reflecting the vertical direction. Examples of the colour pattern symmetry group are shown in **Figure 13**, see page 106.

It can be seen that the symmetry groups of weaves, shown in **Figure 14** (see page 107), are completely different. There were three main symmetry groups – p111 (238 units), pmm2 (141 units) and p112 (128 units). A few weaves of the p1m1 group (65 units), and very few of the pm11 symmetry group fabrics were found.

According to previous researches, for Lithuanian pick-up sashes, one-directional symmetry groups dominated, most of which were woven using the pmm2 symmetry group. However, in overshoot fabrics this group was never found. The overshoot fabrics had two-directional p2mm and p4mm symmetry groups [16,18]. Examples of weave symmetry groups are shown in **Figure 15** (see page 107).

Latvian ornaments of sashes consisted of open, closed and balanced groups [19]. Closed ornaments were formed with one or more independent signs surrounded with one bigger sign. Open ornaments are made from single independent composition elements connected by a specific procedure. The ornaments of Latvian sashes are significantly different from Lithuanian, being more complex. Latvian patterned bedspreads are woven in a small or big pattern. [20].

For Latvian belts, the pmm2 symmetry group was the most commonly used, i.e. there is a central belt motif and smaller groups of ornaments on both sides. More than a half of the belts analyzed are asymmetrical, i.e. they are assigned to the p111 group [21].

Belorussian patterned fabrics are characterised by geometric (straight lines, rectangles, squares, crosses, zigzags, rhombs, triangles), floral (parts of plants, leaves, flowers, buds), animal (animals and birds) ornaments, the most often made according to the p2mm, p1m1 and pm11 symmetry groups [22]. Belorussian fabric ornamentation and its motifs are very similar to Lithuanian fabric ornaments.

Patterned fabrics from Pennsylvania (USA) [22] were established according to the p2mm symmetry group, i.e. they were symmetrical to the warp and weft directions, and their repeats were the same. There are some individual cases where fabrics were woven using pmm2 and p1a1 symmetry groups. It can also be noted that most of the patterns are similar to Lithuanian four-harness or checked twill (satin) pattern fabrics [23].

In Greek patterned fabrics motifs of rhombs, which usually tends to have d2, rarely d4 symmetry groups, are the most common. Rhomb, parallelogram, triangle motifs in various symmetry groups are also popular. Stylised floral motifs are woven in the overlaid technique, according to the d1 symmetry group. Octagonal stars are also woven using the d1 overlaid technique. Also stylised human figures created by the d1 symmetry group were found. There were a few asymmetrical floral patterns. In the case of our study as well as in [24], fabrics were more often woven using one-directional symmetry group. For pattern ornamentation, the pmm2, pm11, pma2, p112, p1m1 & p1a1 symmetry groups were used [24]. From two-directional symmetry groups, the most often group is c2mm, with other two-directional groups being rarely used.

Comparing the diagrams of **Figures 10** and **11**, it is clearly shown that they are quite different. Although the p111 group dominated the symmetry groups of patterns, its prevalence is just a little different from other symmetry groups (p2mm, pmm2, p112). Moreover there is a large difference between the pm11 and p1m1 symmetry groups. Group pm11 is in the second place with regard to pattern distribution, but in weave distribution it is not very common. In contrast, the p1m1 group is one of the most unpopular patterns, but is one of the most popular in weaves. A similar tendency exists in the p112 symmetry group.

Hence it can be seen that although in patterns and weaves the same symmetry groups can be found, their distribution and prevalence is different.

■ Conclusions

1. In Lithuanian ethnographic home textiles, six different types of patterns were distinguished: plane, fancy, motley, checked, striped and lace. The most popular were fancy, motley,

checked and plane fabrics. There were a low amount of other pattern exhibits.

2. In the home textiles analyzed 22 different types of weaves were found. The most popular were checked twill, plain and overshoot four-harness weaves.
3. While analysing symmetry groups of color repeats and weaves according to classical principles of ornamentation, six same symmetry groups were distinguished.
4. Although patterns and weaves have the same symmetry groups, their distribution is different in both cases.

References

1. Features of Lithuanian Ethnography Vilnius: Valstybinė politinės ir mokslinės literatūros leidykla, 1964. 680 p. [In Lithuanian]
2. Kudirka J. Territorial Peculiarities of Folk Art, Peculiarity of Folk Art. Kaunas, 1984, pp. 95-102. [In Lithuanian]
3. Tallat-Kelpšaitė-Niunkienė G. *Lithuanian Folk Woven Fabrics (2. Bedspreads)*, Lietuvos TSR mokslų akademijos darbai. A serija, No. 2 (24), 1967. [In Lithuanian]
4. Tallat-Kelpšaitė-Niunkienė G. *Colours of Bedspreads*, Colour in Lithuanian Folk Art. Vilnius: LTSR Kultūros ministerija, Mokslinės kultūros centras, 1988, pp. 32-36. [In Lithuanian]
5. Šaknienė M. *Woven Fabrics Colours and Their Compositions*, Peculiarity of Folk Art. Kaunas, 1984, pp. 62-65. [In Lithuanian]
6. Kudirka J. *Lithuanian Folk Ornaments*, Children and Folk Art. Vilnius: Lietuvos TSR Kultūros ministerija, Lietuvos TSR Mokslinis metodinis kultūros centras, 1989, pp. 93-107. [In Lithuanian]
7. Šidiškienė I. *Zhichkai in Woven Fabrics and Cloths*, Colour in Lithuanian Folk Art. Vilnius: LTSR Kultūros ministerija, Mokslinės kultūros centras, 1988, pp. 75-83. [In Lithuanian]
8. Tallat-Kelpšaitė-Niunkienė G. *Lithuanian Folk Woven Fabrics (1. Towels)*, Lietuvos TSR mokslų akademijos darbai. A serija, No. 1 (20), 1966. [In Lithuanian]
9. Woods H J. The Geometrical Basis of Pattern Design. Part III: Geometrical Symmetry in Plane Patterns. *The Journal of the Textile Institute* 1935; 26: T341-T357.
9. Hann M A. Symmetry in Regular Repeating Patterns: Case Studies from Various Cultural Settings. *The Journal of the Textile Institute* 1992; 4(83): 579-589.
10. Washburn D K. *The Property of Symmetry and the Concept of Ethnic Style*. Archeological Approaches to Cultural Identity – London: Unwin Hyman, 1989: pp. 157-173.

11. Washburn D and Humphrey D. Symmetries in the Mind: Production, Perception, and Preference for Seven One-Dimensional Patterns. *Visual Arts Research* 2001; 27, 2: 57-68.
12. Neverauskienė D, Kazlauskienė I and Milašius V. The Symmetry Peculiarities of Ornamentation of National Lithuanian Woven Fabrics. *Fibres and Textiles in Eastern Europe* 2001; 9, 1(32): pp. 63-67.
13. Katunskis J, Milašius V and Taylor D. Software for Creation of a Database of Ornamentation of National Woven Fabrics. *Fibres and Textiles in Eastern Europe* 2004; 12, 4(48): 43-46.
14. Milašius V, Neverauskienė D, Katunskis J and Kazlauskienė I. The Mathematical Basis of Ornamentation of Patterned Woven Fabrics. *Fibres and Textiles in Eastern Europe* 2002; 10, 4(39): 34-39.
15. Zdanavičiūtė I, Milašius V and Katunskis J. The Peculiarities of the Ornamentation of Lithuanian Traditional Woven Textiles. *Fibres and Textiles in Eastern Europe* 2006; 14, 2(56): 37-40.
16. Petruilytė S and Petrulis D. Textile Heritage of North and East Lithuania: National Overshot Fabrics. *Fibres and Textiles in Eastern Europe* 2014; 22, 6(108): 137-143.
17. Neverauskienė D., Kazlauskienė I and Milašius V. The Symmetry Peculiarities of Ornamentation of National Lithuanian Woven Fabrics. *Fibres and Textiles in Eastern Europe* 2001; 9, 1(32): 34-39.
18. Vilumsone I. *The Analysis of the Composition of Narrow Pattern in Latvian Woven Countrachanged Sashes*. Summary of the Thesis for Scientific Degree of the Doctor of Engineering Sciences, 1997.
19. Kikule D. Bed Spread Colour Composition Principles in Latvia in the End of the 19th Century and the Beginning of the 20th Century. International Conference *The Textiles: Research and Technology*, 21th to 22th September, 2000: pp. 195-200.
20. Kukle S and Zommere G. The Organization of Symbols and Motifs Used in Latvian Patterned Belts. 4th international Textile, Clothing & Design Conference *Magic World of Textiles*, October 5th to 8th 2008, Dubrovnik, Croatia: pp. 975-980.
21. Maciuška V F and Kavalenka V V. *Belaruski narodny arnament*. – Grodno, Litografia”, 1953.
22. *A Handweaver's Source Book* ed. by M. Porter Davison, Swarthmore, Pennsylvania, 1953.
23. Lekka L and Dascalopoulos S. Motifs and Symmetry Characteristics of the Ornamentation on Traditional Greek Woven Textiles from the Area of the Aegean. *Fibres and Textiles in Eastern Europe* 2008; 16, 3(68): 74-78.



III Trade Fair for Technical Textiles

Innovatex 2016 Conference

12-13/10/2016

Łódź, Poland



THE TRADE FAIR FOR TECHNICAL TEXTILES IS:

- the most important meeting of the textile industry in Poland
- a perfect place for making business contacts and exchanging experience
- an opportunity to present new products and technologies
- a meeting of business and science in the centre of Poland
- an opportunity for direct contact with companies which operate actively on the Polish technical textile market

BENEFITS OF PARTICIPATING:

- promoting products on the Polish market
- identifying customer expectations on the Polish market
- meeting with competitors
- attracting new customers and business partners
- establishing direct business contact with Polish producers of technical textiles

SUBJECT AREAS:

- technical fibers and yarns,
- technical woven and knitted fabrics,
- non-wovens,
- textile chemistry
- technical haberdashery
- machinery, equipment, hardware and accessories for production and services
- technical products for leather industry centers and research institutions
- manufacturing technologies
- research centres and institutes and technical universities

SESSIONS WILL INCLUDE THE FOLLOWINGS AREAS OF EVERYDAY AND ECONOMIC LIFE:

- **the MEDTEX session – everyday protection, improving the quality of everyday life:** medical and hygienic textiles, rehabilitation and recreational textiles
- **the PROETEX session – protection of life and health in the working environment:** textile solutions for personal protection, textiles for the protection of the working environment
- **the BUDTEX session – healthy home:** textiles for the construction industry and interior decoration
- **the GEOTTEX session – safe transportation:** textiles for means of transport, geotextiles, textiles for road protection
- **the AGROTEX session – healthy food, clean water and air:** textiles for the protection of plants and animals as well as the natural environment
- **the TECHTEX session – innovative technical textiles:** textiles for composites, footwear and the leather industry as well as for special applications

For more information please contact:

Katarzyna Piekłak Ph. D.,
 Phone: + 48 42 631 33 38
 Mail: innovatex@info.p.lodz.pl
 see also page 150

Received 12.01.2016 Reviewed 12.04.2016