CLASSIFICATION, CHARACTERISTICS, AND PROPERTIES OF NATURAL SILK WASTE

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Abstract: This article presents a comprehensive review of existing classifications of formation, types, structure and group of silk fiber waste and proposes a new classification for the use of natural silk waste.

Many scientists and silk industry specialists have studied the classification of natural silk fiber waste, but unfortunately have not come to a final scientifically based recommendation.

Basically, fibrous waste of natural silk is classified depending on the place of its formation, that is, only the recycled part of natural silk waste is taken into account.

The classification of natural silk fiber waste described above is incomplete. Any classification must be subdivided into classes, subclasses, groups, subgroups, and finally, types. In this case, such a scientific approach is lacking.

The disadvantage of the above classifications is that they were limited to dividing all fibrous waste of natural silk into richly fibrous and poorly fibrous;

into long-fiber, medium-fiber and short-fiber; parallelized and entangled; in the group of cocoon mixtures, scraps and canvases from donkeys, etc. This type of classification of fibrous waste of natural silk is insufficient.

Based on the analysis of the above works and the generalization of industrial experiments, as well as the opinions of silk specialists, it can be concluded that it would be most correct to classify fibrous waste of natural silk in the course of textile materials science in the following sequence:

Class, Subclass, Group and Subgroup.

Finally, the type represents the name of each type of fibrous waste of natural silk in accordance with the current GOST.

The sequence of classification of fibrous waste of natural silk makes it possible to conduct targeted scientific research and experimental design work on the development of a scientific basis for the primary processing of silk raw materials and the further processing of waste from silk production in spinning. And also in other related branches of the textile industry for the production of consumer goods and their technical control.

Key words: Fiber waste, cocoons, raw silk, silk yarn, blended yarn, sorting shop waste, cocoon-winding shop waste, inspection and cleaning shop waste, high-fiber, low-fiber, fibrous mass, degree of straightening, fiber length, class, subclass, group, subgroup.

During the process of harvesting and further processing of silkworm cocoons, as well as raw silk, a significant amount of natural silk waste is generated in the form of cocoons that cannot be unwound, fibrous waste from sericulture, cocoon reeling, silk twisting and silk weaving. The processing of this waste is of great national economic importance, since for every

kilogram of raw silk produced, more than one kilogram of various waste is produced out of the total mass of raw materials.

Fibrous waste obtained at various stages of processing cocoons into raw silk and the raw silk itself is used to produce silk and blended yarn. The process of obtaining such yarn is complex, labor-intensive and involves many transitions (up to 40 technological process transitions).

Developing a shortened technological process for processing fibrous waste from natural silk requires a whole range of research and development work, starting with the primary processing of cocoons and ending with the production of finished yarn. To do this, it is first necessary to classify silk waste by type and properties based on knowledge of their individual characteristics.

Classification of raw materials, materials, and products is one of the key issues for all types of science. In particular, the value of natural silk fibrous waste and the characteristics of technological processing modes can be determined.

Many scientists and specialists in the silk industry have studied the issues of classifying fibrous waste from natural silk [1,2,3,4], but unfortunately they have not come to a final scientifically based recommendation.

Authors [3,5] mainly classify fibrous waste of natural silk depending on the place of its formation, that is, they take into account only the recycled part of the waste of natural silk.

- waste from the sorting shop;
- waste from the cocoon winding shop;
- waste from the control and cleaning shop.

The classification of fibrous waste of natural silk by the above method is incomplete. Any classification must be divided into classes, subclasses, groups, subgroups and finally types. In this case, such a scientific approach is absent.

Authors [4] recommend classifying fibrous waste of natural silk depending on their processing capacity into two groups:

- high-fiber group;
- low-fiber groups;

Alimova H.A. [1,2] approaches the classification of fibrous waste of natural silk in a more scientifically based direction and recommends classifying fibrous waste of natural silk;

- by fiber content;
- by degree of straightness;
- all waste along the length of the fibers;

The disadvantage of the above classifications is that they were limited to dividing all fibrous waste of natural silk into richly fibrous and poorly fibrous; into long-fiber, medium-fiber and short-fiber; parallelized and entangled; in the group of cocoon mixtures, scraps and canvases from donkeys, etc.

This type of classification of fibrous waste of natural silk is insufficient.

The wool obtained during the process of harvesting and primary processing of cocoons is not taken into account; after some processing, it can be used as a heat- insulating material or for obtaining chemical preparations in combination with various chemical reagents.

In addition, the sdir cotton wool obtained in the process of harvesting live cocoons cannot be combined with the sdir cotton wool obtained in the sorting shop of the cocoon

winding factory into the same group, due to the differences in their physicochemical properties [6,7], physical and mechanical [8,9], geometric [10,11] properties, content of foreign impurities and prospects for further processing. The same applies to other fibrous waste products of natural silk.

However, we would like to note the positive merits of the author of the work [1,2], which gives impetus and direction to our research in the field of developing a scientifically based classification of fibrous waste of natural silk.

Based on the analysis of the above works and the generalization of production experiments, as well as the opinions of silk specialists, it can be concluded that it would be most correct to classify fibrous waste of natural silk in the course of textile materials science in the following sequence [12]:

A class can be an industry where one or another type of fibrous waste of natural silk is formed, that is, waste from sericulture and waste from the silk industry;

A subclass can be called a place where fibrous waste of natural silk is obtained in production (base for primary processing of cocoons, cocoon winding, silk twisting, silk weaving and silk spinning);

The group is a type of fibrous waste of natural silk depending on its appearance (cocoon-like, fiber-like);

The subgroup is characterized by the possibility of processing this raw material in one or another sector of the national economy (production of yarn, non-woven fabric, paper, thermal insulation material, surfactants, etc.);

Finally, the type represents the name of each type of fibrous waste of natural silk in accordance with the current GOST.

To facilitate the development of the proposed classification of fibrous waste of natural silk, a classification scheme has been compiled (Fig. 1.1).
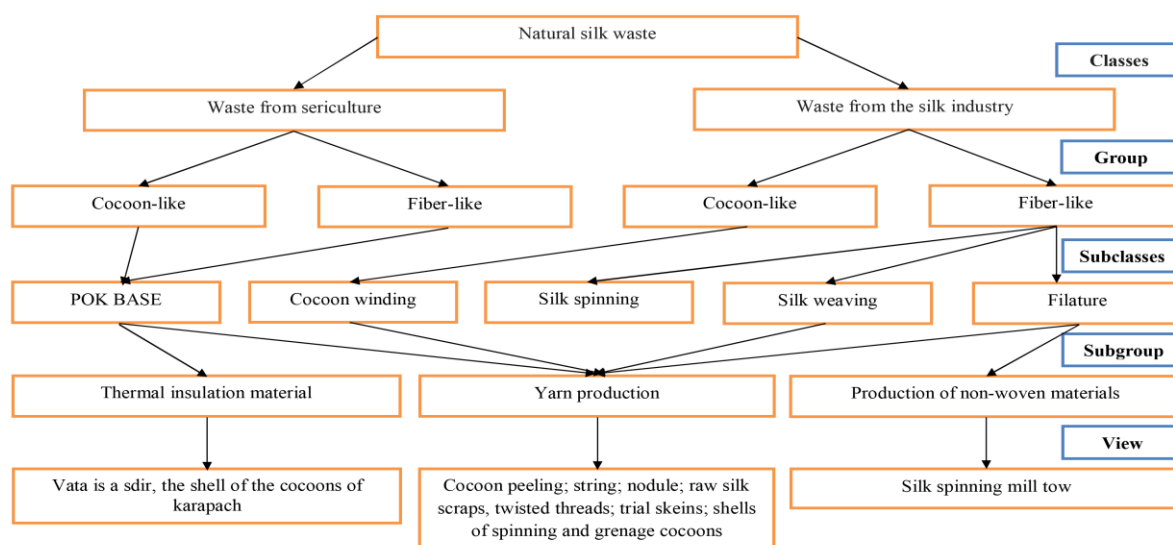

Fig. 1.1. Classification of fibrous waste of natural silk.

The analysis of the classification scheme allows us to draw the following conclusion; the sequence of classification of fibrous waste of natural silk

(Fig. 1.1) makes it possible to conduct targeted scientific research and experimental design work on the development of a scientific basis for the primary processing of silk raw materials and the further processing of waste from silk production in spinning.

And also in other related branches of the textile industry for the production of consumer goods and their technical control.

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